

RECORD

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F.R. Fosberg
Field Book No. 88.

43571-43890

All typed

Collection and Field Note Book

No. 88

(March 22, 1963 - July 12, 1963)

(43571 - 43890)

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Collection and Field Note Book

No. 68

(March 31, 1963 - July 12, 1963)

(43571 - 43890)

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Field Book No. 88.

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Pacific Vegetation Project
c/o National Research Council
Washington 25 DC. USA

Virginia

March 31 - 5 mi. n.w. Fairfax
 ca s.e. of Chantilly Rolling land
 Pinus virginiana woods
 with a patch of deciduous
 wood in it, mostly
 Acer rubrum, a very few
 Fraxinodendron and Quercus sp.
 Locally a few Liquidambar

Evergreen herbs & dwarf shrubs
 la Lycopodium complanatum
 lc Mitchellia repens
 l Polystichum acrostichoides
 c Chimaphila maculata
 n Goodyera pubescens
 Antennaria parlinii

Shrubs

Cornus florida
 Vaccinium cf. atrococcum
 Vaccinium cf. vacillans
 Viburnum acerifolium
 Smilax glauca
 S. rotundifolia
 Ilex opaca

Panicum japonica abundant
 in edges, sparse inside woods
 Large ant hill
 over 1 m. wide, 4-5 dm. high
 in edge of forest.

c Leucobryum
 c "Bartramia"
~~Cladonia~~
 l Polystichum commune

Mar. 31 - 4 1/2 mi. n.w. Fairfax
 Younger pine forest,
 fairly dense.

Evergreen herbs

l Antennaria parlinii
 l Polystichum acrostichoides
 n Goodyera pubescens
 n Chimaphila maculata
 n Mitchellia repens

c Leucobryum
 c "Bartramia"
 la Cladonia cf. rangiferina

n Viburnum acerifolium
 o Prunus serotina
 c Smilax rotundifolia

1963 - Va - N.C. - Ga - Ala - Miss

April 16 - flight from
Washington to Charlotte
DC - at 10,000' dep. 2:15
rather overcast.

First landscape a pale
brownish green. Fields
green. Visibility south
of Washington poor.

3:10 many small fields
with ravines & rough
ground in forest. Fields
mostly bare soil - pinkish
or pale to reddish. A few
just turning green, 60-80
% of ground bare.

3:28 landing. ^{* Charlotte} - more
woods & landscape greener.
Trees generally leafed out,
but still light green.
Tulips & oaks abundant,
patches of pine.

3:32 landed.

open slopes covered by kudzu are
completely gray.

4:20 left Charlotte
Corns florida fully out,
conspicuous.
Some small scattered
hills, one perfect ~~granite~~
rock shape, to west.

Power line right of way
poorly vegetated, a raw
eroded gash in landscape.
Dammed river very muddy.

South of Charlotte
many more of fields are
somewhat green. Soil varies
from almost white to red.

Proportion of wooded land
varies considerably locally.

Conspicuous white trees
in forests, *Cornus florida*,
vary from 0 to very abundant.

4:22 Conspicuous erosion
scars, reddish, on open slopes
and in ~~near~~ thin forest.

5:11 Passed a large granite dome -
some sort of installation on top of
railway straight up e. a m. side,
Stone Mt.?

Circled for a time south
of Atlanta. Much wooded
country, but great
amount of subdivision,
industry, highway
construction.

Trip Vicksburg-Dallas
completely unsatisfactory
due to poor visibility.

Dallas - Ft. Worth (Int. side)
of plain)

Land west of Dallas
is low, soil is dark,
sloughs and ponds
frequent, patches of
woods, either dense or
open forest, are frequent
alternating with cultivated
fields. Gallery forest
along sloughs and rows
of trees along roads and
edges of fields. General
landscape is green,
all trees broad leaved.

Ft. Worth - Odessa

A great proportion of
the land west of Ft. Worth
seems to be pastured,
with patches of wood,
gallery wood along ravines,
and frequent evidence of
invasion by shrubs.

Westward the wood
very rapidly disappears,
a fair proportion (20-25%?) of
the land is cultivated.

Trees principally along
ravines and streams,
but not always even there.

Soil a variable tan to
chocolate to blackish brown.

9:49

Possum
Kingdom
Lake?

9:53

assuming
course is
west

9:57

9:58

Less cultivation, large open
pasture. then a big reservoir
with considerable closed &
open woods and savanna
around it. Northwest of this
an area of considerable
cultivation, west of reservoir
a complex of savanna
gallery forest, and open to
closed woods, showing a
great deal of influence of
old shallow ponds and meandering
stream beds, but pattern
obscure.

Then n.w.-s.e. trending
complex dendritic drainage
a gully pattern alternating
with strips of ~~pasture~~
grassland. Then more
complex meander systems
the gully systems and
meander systems wooded,
sparsely to densely, generally
trending n.w.-s.e., with
strips (or interfluvies) of grass
between them.

Westward soil becomes
redder, woodland sparser,
savanna and grassland
more general, but much
more evidence of invasion
of shrubs in grassland.

Much more cultivation (30-40%)
meander system & much wood
esp. gallery and open woodland.

10:00

alternating strips of cultivation and irregular strips of open woods to savanna.

10:01

A fair sized river, n. w. - s. e. with large conspicuous meander. River with broad sandy, but not braided, bed. little water.

West of this country is generally grassland and savanna, and especially shrub savanna. The river swings strongly to left part north of

10:05

course, is dammed and forms a very complicated reservoir. Wooded

land, mostly rather open, forms a mosaic with grass, the woods being in old meander systems, especially, and much sparser, varying to savanna and grass on interfluvies. The directions of flow very confused now, tending n. e. toward

reservoir. Much densely wooded land well north of course toward reservoir.

10:09

Meander systems and ravines again tending north to n. w. general landscape is open forest

to open scrub with gallery wood along ravines and meanders.

10:10

Area of open to closed wood or scrub 80% or more, scattered cultivated patches.

10:11

10:12

More grass westward. River no longer in sight still much open wood and savanna, becoming more grassy westward. Small muddy reservoir on course. Another well to north. But on only a small stream.

10:13

General landscape is savanna with some dense enough to be open wood, some grass and some cultivation.

10:15

Meander systems with gallery wood, but generally less open woods more savanna than farther east. Much evidence of erosion. Soil an orange red.

10:16

Grassland to savanna, becoming sparser and with less traces of stream courses and gallery westward.

10:17

Now savanna to open woodland. Cultivation locally.

10:18

Large mosaic of grassland & savanna to open woods. Some poor gallery wood, streams trending n. to

10:19

n.e., very open dendritic pattern, still with traces of old meanders but there not now much wooded.

10:20

Aspect drier westward. About 50% grass, 50% savanna with irregular meander pattern fairly general. Less savanna than more savanna.

10:21

Pattern now suggests erosional cutting down into flat bedded substratum with trees forming certain beds (photos taken)

10:23

Trees sparser but still same sort of pattern, some large cultivated areas. Contour farming.

10:24

Cultivation predominant.

10:25

10:26

10:27

A very muddy medium small reservoir, with a large wooded area n.w. of it. Cultivation & red soil west of it. Irregular pasture much eroded, savanna along course. Soil red.

10:28

10:29

Mosaic of eroded savanna and cultivation, cult. dominant north of course, savanna dominant, badly sheet eroded and red, along course.

10:30

Mostly cultivated. (Perhaps Abilene area)

10:32

Narrow irregular strips of open forest & savanna along streams. Cultivation dominant but many angular patches of open wood & savanna. Eroded strips along streams and very irregular escarpments have open wood & savanna.

10:34

10:35

Cultivation dominant, soil darker red & purple. A plateau with almost white soil, savanna & grass, surrounded by a more densely wooded very irregular escarpment. Dendritic drainage patterns, more densely wooded, characteristic of top of plateau. Bedding ~~very~~ quite noticeable. (Is this Edwards Plateau?)

10:37

This continues, but becoming more cultivated and soil in cult. parts red.

10:33

Similar, with sparse
irregular gallery wood
in ravines, some small
mesas.

10:40

Density of savanna varies
with degree of dissection.

Grassland to savanna along
course almost 100% cult.
to north of course, coming
closer to course. Bedding
shows in vegetation -
esp. in uneven density of
grass, along small
dendritic broad ravine
systems.

10:42

Mostly cultivated, savanna
and ^{iron} gallery wood along stream
courses.

10:43

2/3 - 3/4 cult. with savanna.
Much more cultivation to
north of course. Soil red.

10:44

Quite green along streams.
Small reservoir - water
very dark, but not muddy.

10:46

Savanna, some cultivation.
another small reservoir
but muddy to north.

10:47

Mosaic of cultivation and
savanna. Savanna
near streams, poor gallery wood
along stream. (No water in
these streams)

10:48

Sheet erosion ~~to~~ very bad.
Mostly savanna, less cult.

10:49

Generally the cult. areas
are on middle of interfluvial
shallow dissection, more
conspicuous, almost
entirely savanna, badly
eroded. Soil in eroded
areas tan to red.

10:50

Very narrow tightly
meandering stream
with water in it,
along course. Dendritic
tributary systems
all dry. Savanna
general. Cultivation
to north.

10:52

10:53

Savanna on shallow-
ly dissected land, trees
denser near bottoms of
ravines, esp. larger ones.
To north a broad strip
of cultivation on red soil
paralleling this broad
strip of savanna on
dissected pale tan to
whitish soil. This
dissection very shallow
and rounded.

10:55

Large town a small city
to north on edge of cultivation.
Now large cult. areas
close to course. Fairly large
airport with 2 asphalt strips.

10:57

Extensive savanna
with scattered vernal pools.

10:53

Large cultivated area.

Large vernal pools & alkali flats to north in extensive savanna. Cult. & savanna mosaic along course.

10:54

Savanna with a patch of barchans.

Then cultivation and a ~~small~~ town, mostly cult. with brownish red soil.

11:00

Savanna with vernal pools and an elongated slough-like one several miles long, n.w.s.e.

Then large mosaic of cult. & ~~some~~ savanna.

11:02

To north mostly savanna with a few vernal pools, cult plus some savanna along course. Broad strip of savanna well to north.

11:03

Cult along course, large tank farm ~~and~~

11:04

City - prob. Midland.

surrounded by ~~a~~ large mosaic of savanna and cult.

To west around airport extending savanna.

some of it showing signs of former cultivation

scattered vernal pools.

Some yucca in this savanna.

In some areas the trees are

gray, in other bright green. These apparently Prosopis.

11:08

Landed - at Midlands - Odessa airport.

11:29

Left Midlands for El Paso.

Savanna - ~~for~~ some barchans and dune terrain. scattered dry vernal pools. oil pumps locally. A few windmills with accompanying small ponds. Some scattered cultivation, esp. in a strip extending west along a road. oil field to north. Trees become smaller and sparser westward.

11:31

11:32

oil fields become fairly general. small refineries.

Country is a dry sparse savanna. Generally a gray mottled appearance, apparently due to small depressions with thin dry grass between slightly higher more bare ground. Scattered vernal pools.

11:34

oil wells in geometrical arrangement over most of area. No more oil wells along course but some to north.

11:37

Generally savanna, vernal pools irregularly distributed, vague

watercourses or depression
trending n.e.-s.w., more densely
vegetated.

11:39

Scattered patches of pale
sand dunes, very irregular.
Then a solid dune area,
partly active, partly stabilized
by vegetation.

11:40

A more irregular oilfield
with patches of reddish
sand dunes.

11:42

Land becomes redder and
vegetation very sparse.
Oil field continues, still
spotty.

11:43

Oil field stops. irregular
sandy areas, savanna,
now vegetated depressions
and some vernal pools.

11:44

reddish sparse shrub savanna
or desert.

11:45

same but areas of vernal pools.

11:46

same, but along course
a dendritic drainage
pattern in a pale soil,
the watercourses dark
gray to greenish, not very
well defined, as though
more like elongate ponds
than streams, dry now.

11:48

The become confused and
fade into ~~red~~ uniform
red shrub savanna or desert.
Local pale patches with

vernal pools.

11:49

Oil fields, in same desert
but very sparse. White

11:51

to area with irregular
pattern of darker depressions.
These areas more extensive
but less distinct. Oil
fields only in distance.

11:53

A winding river, with
water and dark vegetation
in slightly braided
streamcourse roughly
following course until
a dam and small reservoir.
Prob. the Pecos. and
Red Bluff Reservoir.

W of this some evidence
of former cultivation,
contour round breaks, etc.

W of this pale soil,
some dark stream
beds trending toward Pecos.
Curious pattern of
very pale depressions (or elevations)
(likely elevations), twisted
and sinuous. Vegetation
mostly very sparse except
in occasional depressions
and water courses.

11:58

Except for their irregularities
the country is very uniform.
A few watercourses are sharper
and have a conspicuous gallery
scrub. Very sparse network of roads

12:02

Very open extensive drainage system, rather dendritic trending toward Pecos, back along course

12:03

Irregular scarps, mesas very small buttes.

12:04

Dissection increases notably as Guadalupe Mts. are approached.

Watercourses become more numerous. Bedding of rock shows in sinuous lines. Vegetation very scanty, more notable near watercourses. Many small mesas, buttes, slope up to crest and rather abrupt west scarp of a low ridge branching off to s.e. from south promontory of Guadalupe Mts.

12:03

12:09

Rolling desert land, some small mts.

desert veg. very sparse.

12:10

Some small, geometrical cultivated areas on east slope up from a large salt flat ~~a plaza~~.

The bottom of this is rather irregular with large "pools" and a central dry lake, not very extensive.

12:12

Then some low sand hills with shrubs (Prosopis?). A few small cultivated areas, but mostly very flat pale desert. Much cultivation locally in middle distance to north.

12:14

Desert along course with very sparse veg. water courses trending toward dry lake, more heavily vegetated.

12:15

Scattered vernal pools & depressions.

mottled pattern of sand (?) and sparse veg. possibly Prosopis sand dunes.

12:16

Small check dams in water courses. Dry pools behind them. A few small black barns.

12:17

~~Several~~ small isolated mountains a large sharp topped butte in middle distance and others scattered north ~~westward~~.

12:18

Along course extensive mottled pale desert. Prob. Prosopis sand dunes.

Dendritic, ill-defined drainage patterns

converging eastward.

12:20

Westernmost of buttes dark, flat topped in distance to north.

In distance, indistinct, a high even ridge trending east-west (apparently).

A highway parallels course a bit to north.

1223

A very low range of hill rounded, cut in flat beds, with show in concentric irregular pattern.

More of these scattered westward.

1224

Another dark butte or knob mt. in distance to north.

Low hills with concentric bedding become more prominent and higher.

Vegetation very sparse, not much influenced by bedding.

Depressions are sandy and reddish. scattered shrubs. This more general westward. no more hills.

1228

Shrubs more and more conspicuous. Must be *Prosopis*. Perhaps this is nearer to a random distribution than most vegetation.

1230

(photos - b.w.)

1231

Descending to El Paso airport there certainly are *Prosopis* sandhills.

Scale ~~is~~ uncertainty makes it very difficult

To distinguish tree savanna from shrub savanna and tree desert from shrub desert from the air, unless both trees and shrubs are present, and even then it is not too certain unless size of one is known.

1208

El Paso to Douglas
Left 9 P.

San Andres Mts. a ^{westward} very steeply westward dipping series of beds - dip westward at least 90° - sparse to open shrub vegetation on the dip slope, very little on the east slope.

Desert alluvial fans stretching down from base of the Rio Grande - here rather canalized and a very unimpressive river. Bottom land all cultivated. Almost no trees any more. West side of river a vast area of *Prosopis* sand dunes - the strip just above the cult. land a pale grey sand, beyond that a tawny to almost reddish sand. very uniform except for a few small depressions.

- with less vegetation.
 1:19 Some small lava flows in middle distance.
 1:20 A low range of hills across course, then a higher clump of hills - sparse desert veg. Then a darker landscape of scattered low volcanic cones, with craters still evident though ^{mostly} eroded out at one side. - ~~then darker~~ these purplish brown. red sand between them no regularity to side that is breached.
 1:24 Reddish sand, with only a few small cones in middle distance.
 1:26 Irregular alkali flats and dune patches then apparently desert-grassland with irregular small dune areas. Depressions appearing slightly greenish, rest of landscape tawny.
 1:28 some scattered areas of small relief.
 1:29 Scattered cult. patches - brown now.
 1:30 Clump of mts. in distance. Large area of *Crotopis* ~~sand dunes~~ (?) fading into parallel wash system running into the dune area.

- 1:31 Hilly area - very sparse shrub desert.
 1:32 hills gradually aligned into a more or less parallel drainage system ~~for~~ trending with course, more veg. in washes. very sparse on hills. hills develop "cross-ripple" pattern spreads out, water course fewer, relief less.
 1:34 irregularly low-hilly.
 1:35 hills get higher
 veg. extremely sparse
 These hills ~~and~~ diverge northward from course
 1:39 irregular dune areas and general low relief along course.
 1:40 elongate mesas and wide watercourses (gray against tawny landscape) trending westward.
 dark low hill in middle distance.
 1:42 several low ridges trending more or less with course.
 1:44 Depression in distance with some cultivation, narrow one extending from it transverse to course - ~~yellow~~ thinly yellowish with ~~very~~ a flowering herb, perhaps *Pectis papposa*.
 1:46 We have been following

a railroad for some time.
In distance is a large
pale dry lake.

1:47

Here cultivation in
a belt south from it
mixed with areas of
low sand dunes.

1:48

Then a sterile red-brown,
mottled landscape.
Then reddish washes
with shrubs, perhaps
Prosopis sand dunes.

1:49

A rough rocky range
of mts. with scattered
trees near tops, along
course. Trees may be
junipers.

1:51

Then another elongate
depression, with flats
and dune areas, arcuate,
concave west.

1:52

Drainage patterns from
west running into this
in fan form.

1:53

Cult. area along course.
A high, very rocky
mountain range, wooded
in upper parts extending
far to north. Extensive
upland open forests to
north, very sparse along
crest, where mts. are lower
but valley bottoms well
wooded.

This is quite extensive.
Strike of beds and
cuestas more or less
parallel to course, but
these beds not evident
farther north.

1:56

Relief becomes less
rugged but there is still
extensive open (juniper?) forest.
Relief gradually smooths
out into low hills and
forest disappears except
in ravines. Hills with sparse
scrub.

1:58

1:59

Another mountain range,
but much less rugged
and scarcely any
(sparse) forest in upper part,
mostly with irregular
scrub, some scattered junipers (P).
Tades of into low hills,
with an even sparse
scrub.

2:01

Patches of a dense gray scrub
or scrub forest, and large
patches of gray grass flat
esp. forming cover along
watercourses (which are
in places incised into
them).

2:03

Irregular gray scrub,
patches of sand
patches of sparse green scrub
(*Prosopis* or *Larrea*?) in middle
distance.

2:04

Landung in Douglas.
Gray patches also a sandy
grass.

2:24

left Douglas for Tucson.
Some cultivation in flat
valley bottom around Douglas.
Much dry grassland.
Fan slopes to east are
covered with an open sparse
scrub.

Dry grass in flat to north
very patchy, intermingles
with bare ground to
form a small mosaic.
Some cultivation scattered
to north in valley.

2:28

Largely cultivated
but between 2 cult. strips
a low flat with what
looks exactly like tidal
channels.

West of this a fan slope,
scrub rather prominent on
this toward lower edges, but
very sparse farther up,
some grass in washes.

2:31

Patches of low gray hills
separated by red fan slopes.
Ground gets drier.
Considerable crest of hill
to n.e. with a range running
north from them.

2:34

Drainage runs west from
here. Sparse desert scrub on

low relief.

2:35

Rocky range in distance to
n.e. and beyond it a
large dry lake.

Dissected fans on this
side of hills, with intricate
dendritic drainage pattern
outlined in dark shrubs
against a red soil.

2:38

Patches of white locally.
Crossed a dry river,
with cultivation on the
bottom land. Some wooded
areas along river.

2:39

Large dark wooded area
of bottom land.
Same sort of fan and
drainage pattern now
sloping east.

Much more wooded area
along this stream in
distance to north. Is this
Tamarix?

2:43

Dark brown hills, not very
rugged.

A very high rocky, forested
mountain mass to north.
Chiricahua?

Another dry sandy
river, but running now.
With much dense scrub
or forest locally along it.
Rolling desert country.
Drainage n.w.

2:45

- 2:46 Desert laid out in streets,
no houses.
- 2:47 Shrub desert vegetation
in wavy braided lines
corresponding to washes.
- 2:50 Scattered small trees.
Vegetation more and more
dense as Tucson is approached.
More trees.
- Parlinsonia & Larrea are
dominant.
- 2:52 Landed at Tucson.

(2) 3:25 Left Tucson for Phoenix
Tucson is spread sparsely
over an enormous area.

Mts. to west are not
high but very rugged.
Mts to north (Catalina 1)
are very high and well
wooded in the top $\frac{1}{3}$ or $\frac{1}{4}$.

2:30 Dissected fan with braided
washes n. w. of city. Being
built on. Wash in valley
bottom is occupied by golf course.

2:37 Desert being subdivided.

2:39 Desert has closely scattered
trees as well as shrubs.
Drainage trends south,
washes emerge from hills
and spread into distributaries
somewhat braided to very
much so. Marked by a
slight to notable increase in

- 2:36 density of vegetation.
Pattern was clearly
dendritic. Interrupted
by occasional small
abrupt hills emerging
from the alluvium.
- 2:38 Drainage pattern and
vegetation both much
sparser and relief less.
- 2:39 Valley bottom very flat and
entirely cultivated.
Then a sharp small
range of bare mts. just
on course.
To north scattered hill
incl. a couple of old lava plugs.
- 2:40 Then a bare range of
very rocky mts. rather
small, to north.
- 2:41 Another flat cultivated
valley bottom. Some fields
green, others bare.
- 2:43 in middle distance an
area of marsh and standing
water, not a reservoir.
This cultivated valley is
very large. Some areas are
not farmed, have a
sparse irregular vegetation
perhaps $\frac{1}{4}$ uncultivated.
- 3:45 course adjusted more to north.
- 3:46 Most of cultivation left
behind. Very sparse veg.
& some bare hills.

Drainage trending s.e. to

247 Hilley, veg. very sparse -
Cultivation in distance -
248 another valley, transverse to course
but obviously much less
intensively farmed. Very
spotty.

249 Area of bare brown hills -
some fairly high

250 Another intensively cult.
flat valley. Some patches
of sparse irregular veg.
left, perhaps sandy areas.
Cultivation becomes more
complete. Soil from a
pale tawny to a peculiar
flesh pink. About 1/2 of
fields green.

254 Passed over large city - Phoenix!

255 River has considerable water.
Large city ahead - Phoenix.
Bare rock dome between
the two.

Phoenix - Chino

1/2 hour out of Phoenix
a number of small fresh
lava flows, one coming
from the base of a small cone
with a crater.

Then a large mountain -
a huge breached cone
with a great lava flow
plateau to the north of it,
much eroded, with a
detached fragment
some miles away across
a painted desert-like
erosion valley.

About 10 minutes or less later
crossed Rio Grande near
Albuquerque.

East of Albuquerque
a vast expanse of forested
mts. with snow-capped
peaks just to north, many
areas of mountain meadows

Then about 45 minutes
from Phoenix out in
plain, in the midst of
a vast mesa that is a
lava flow with broken-off
edges, a circular cuesta
with a large eroded dome
in the middle - isolated from

Rocky Mt. front.

Northward about 5-7 minutes, and again out from the Rocky Mt front in the plain, is an extensive complex of old lava flows, small cones, etc, stretching northeastward for a great distance - at least 10 min. flying time. The extent of very flat-topped mesa-land that is capped by lava flows is immense. Some of it is dissected and very intricate, but the original flow was very extensive. Now absolutely flat grassland.

After that the plain is mostly cultivated, with some areas, especially along rivers, of apparently unbroken grassland. Some without traces of former cultivation.

1963

Virginia

May 4 - Fairfax Co.

Arlington Blvd. just

n. of Pine Ridge

Antennaria parlinii

On broad mowed

grassy area along road

formerly deciduous forest

with patches of *Pinus virginiana*Culver's
type

43571

3

Large colony spreading
by stolons, leaves white
beneath, bright green
above; styles purple.
giving heads a
silvery purplish appearance.
No staminate plants seen
in the vicinity

May 12 Weems Creek
Natural Area

Annapolis

High ground in section
toward Annapolis -

tall forest of *Pinus strobus*,
Quercus prinus, *Fragaria*
Americana, *Quercus*
coccinea?, *Liquidambar*,
Quercus falcata,
Carya sp., *Prunus*
cf. avium, *Quercus alba*,
Robinia pseudo-acacia,
Quercus velutina

Understory of
Cornus florida, *Ilex*
opaca, some *Fagus*
Acer rubrum, *Carya* sp.
Nyssa sylvatica,
Carpinus caroliniana,

Low shrub layer
Viburnum dentatum,
V. acerifolium, *Rhus*
toxicodendron,
Prunus serotina,
Lindera benzoin,
Corylus,
Sambucus canadensis

herb layer

large colonies of *Podophyllum*
peltatum, much *Arisaema*
atrorubens, some *A. triphyllum*,
rare - *Potamogeton virginianus*,
Allium vineale,
Smilacina racemosa,
Polypodium acrostichoides

Vines

Lonicera japonica
abundant but not excessive
Vitis sp., *Smilax*
rotundifolia,
Hedera helix.

This in places climbing
trees and forming a mat on
the ground.

Parthenocissus quinquefolia

areas near the slope to Weems Creek seem much more acid - with *Kalmia*, *Vaccinium*, *Rhododendron*, much less *Lonicera*, more *Viburnum acerifolium*. *Quercus prinus* and *Q. falcata* and *Pinus virginiana* become dominant. *Saxifraga* seedlings. *Vaccinium stamineum*. *V. vacillans* + *Gaylussacia baccata* become dominant ~~on the~~ in the low to dwarf scrub layer.

Pinus virginiana seedlings common in undergrowth but are not flourishing well.

Nyssa, *Amelanchier*, *Ilex*, *Kalmia* in a loose shrub layer.

The ground is almost bare of herbs, except a few grasses and *Carex*, but covered by a ~~very~~ carpet of moss and lichens.

A few seedlings

Very large *Populus grandidentata*

A deep ravine in the tulip forest has abundant *Polystichum*, esp. on south side, *Botrychium*, *Lycopodium lucidulum*, *Thelypteris phlegopteris*, *Circaea lutea*, *C. lutetiana*, ~~*C. canadensis*~~ (young), *Lindera*, *Smilax* cf. *herbacea*, *Galium triflorum*, *Athyrium*, *Hieracium*, *Podophyllum*, *Phytolacca americana*, *Eupatorium rugosum*?, *Oxoclea*, *Arisaema atrorubens*, *Rhus toxicodendron*, *Smilax*, *Polygonum* sp., *Rubus phoenicolasius*.

A tremendous tulip tree with many small holes in the lower part, and a large hole, 1-2 cm diam, with a funnel-shaped gnawed opening.

Leaves like on our tulip from lesions.

Moss + *Prunus* at edge of forest near highway, *Populus* + *Platanus* also

v=Labels
40
typed

1963 Maryland
May 12 - Weems Creek

Annapolis ~~not~~

in tall mature deciduous
forest on fine gray-brown friable soil

43572

Cynoglossum virginianum L.

very local

✓ 1

73

Prunus serotina Ehrh.

~~occasional~~ mostly
occasional, seedlings
and small saplings.

✓ 1

74

Dennstaedtia punctilobula

rare and local

(Michx.) Moore

✓ 1

75

Viburnum acerifolium L.

occasional, sterile.

✓ 1

76

Viburnum recognitum Fern.?

occasional, sterile.

✓ 1

77

Lindera benzoin

common, all seen sterile

✓ 1

78

Sambucus canadensis L.

very local, sterile.

✓ 1

79

Smilax rotundifolia L.

occasional

✓ 1

80

Parthenocissus quinquefolia (L.) Planch

occasional, sterile.

✓ 1

81

Quercus prinus L.

occasional

✓ 1

82

Hedera helix L.

locally abundant

✓ 2

83

Liriodendron tulipifera L.

dominant tree

✓ 1

84

Prunus avium L.

common locally.

✓ 3

Anne Arundel Co.

41

buds unopened.

sapling 1 m. tall, prussic
acid odor very strong.

shrub 1 m. tall

shrub 1 m. tall

shrub 1.5 m. tall
aromatic when broken.
shrub, 1 m. tall.

scandent shrub.

wine.

tree 30 m. tall (these broad
leaves are from a lower cauline
branch, taken for record only)
forming a mat on the
ground and climbing
tree-trunks; sterile.

Tree 30 m. tall.

tall tree, bark brown with very
large, long lenticels (this specimen
from lower branches).

- 43585 *Rhus toxicodendron* L.
✓1 very common, all seen sterile.
- ✓1 86 *Acer rubrum* L.
occasional
- ✓2 87 *Arisaema triphyllum* L.
rare
- ✓5 88 *Arisaema atrorubens* (L.) Bl.
common
- ✓2 89 *Fagus grandifolia*
occasional in understory
- ✓1 90 *Uvularia perfoliata* L.
rare
- ✓5 91 *Castanea dentata*
with P.B. Dooling
~~very rare, one suppressed~~
~~shrub seen~~
rare, sprouts only seen.
- ✓1 92 *Juncus virginiana*
very rare, one seen.
- ✓1 93 *Euonymus*
rare
- ✓5 94 *Cornus florida* L.
abundant, dominant
understory tree
- ✓1 95 *Nyssa sylvatica* Marsh.
occasional, shrubs and
small trees only, seen.
- ✓1 96 *Sanicula*
with P.B. Dooling
occasional
- ✓1 97 *Lonicera japonica* Thunb.
abundant
- ✓1 98 (fungus)
parasitic on *Arisaema atrorubens*
- ✓1 99 *Ilex opaca* L.
common in understory

- low scandent shrub,
- small understory tree,
sterile; leaves glaucous beneath,
leaflets green beneath;
spathe green to purplish.
- leaflets glaucous beneath,
spathe green
- small tree, sterile.
- flowers pendent.
- small clump of
sprouts 1.5 - 2 m. tall;
sterile.
- suppressed sapling
0.7 m. tall, sterile.
- prostrate, sterile shrub.
- small tree, branches
spreading, 5 m. tall.
- shrub 2 m. tall.
- sterile herb.
- vine forming a loose
mat on ground where
common or abundant; sterile.
fruiting bodies orange.
- shrub 4 m. tall, sterile.

43600

Botrychium virginianum

rare

✓ 5

01

Podophyllum peltatum

very common, forming large colonies.

✓ 2

02

Polystichum acrostichoides
(Michx.) Schott.
common locally

✓ 1

03

Fraxinus americana L.occasional, large trees
rare.

✓ 1

04

Carpinus caroliniana Walt.
occasional in understorysame. - in ravine
in deciduous forest

✓ 2

05

Osmorhiza

occasional

✓ 2

06

Podophyllum peltatum L.

abundant

✓ 2

07

Adiantum pedatum L.

very local

✓ 2

08

Lycopodium lucidulum Michx.

very rare, on side of ravine

✓ 3

09

Athyrium filix-ferma (L.) Roth

very rare in bottom of

✓ 1

10

Smilax pulverulenta Michx.

rare

✓ 3

11

Botrychium virginianum (L.) Sw.

occasional

✓ 3

12

Thelypteris hexagonoptera (Michx.) Slosson

very local

✓ 1

13

Thalictrum thalictroides

very rare

spreading by subterranean
rhizomes; fruit very young.

sapling 2 m. tall.

small tree; trunk
muscular in appearance;
sterile.roots with strong
licorice odor; flowers white.
spreading by subterranean
rhizomes; flowers white.

fronds almost erect.

erect; leaves lustrous;
flowers green, foetid.

roots fusiform; petals white.

46

1963 Maryland

43614 *Heuchera americana* L. var. *americana*
^{very local}
~~rare~~ in bottom of ravine

✓ 15 *Acer negundo* L.
 ↑ rare

✓ 15 16 *Morus*
 same, edge of forest along highway
 rare

✓ 17 *Morus*
 rare, with 43616, possibly
 same clone.

✓ 18 *Prunus serotina* Ehrh.
 rare

same - in rather than
 with P. B. Dowling open forest or near and
 on slope above creek

✓ 19 *Hieracium venosum* L.
 occasional

✓ 20 *Bambusa canadensis* L.
 occasional

✓ 21 *Quercus phellos*

✓ 22 *Smilax rotundifolia* L.

✓ 23 *Alnus serrulata* Willd.
 edge of water

✓ 24 *Galium aparine* L.
 occasional

✓ 25 *Polygonatum biflorum* (Walt.) Ell.

✓ 26 *Smilacina racemosa* (L.) Desf.

✓ 27 *Galium triflorum* Michx.

✓ 28 *Silene caroliniana* Walt.

Anne Arundel Co.

47

erect, flowers green (petals
 minute spatulate, white)
 shrub; sterile.

shrub 2 m. tall; fruits
 green. leaves rugose
 above

~~with~~ shrub 2.5 m. tall,
 leaves rugose above.

tree 7 m. tall, flowers white.

veins red; flowers yellow.

small tree

vine; flowers green

shrub.

buds cream-white.

sterile at this season.
 petals dried.

- 43629 *Viburnum prunifolium* L.
 ✓ 1
 ✓ 1 30 *Rhododendron nudiflorum* L.
 ✓ 1 31 *Juglans nigra*
 ✓ 1 32 *Celtis occidentalis* L.
 ✓ 1 33 (grass)
 coll. 34 *Kalmia latifolia* L.
 7.7.51 common locally
 ✓ 2 35 *Viburnum acerifolium* L.
 common locally
 ✓ 1 36 *Quercus marilandica*
 rare, on slope above water Muenchh.
 ✓ 1 37 *Pinus virginiana* Mill.
 common
 ✓ 1 38 *Amelanchier arborea*
 common
 ✓ 1 39 moss
 abundant on otherwise bare soil
 ✓ 2 40 *Sassafras albidum* (Nutt.) Nees
 occasional, saplings only.
 ✓ 5 41 *Vaccinium stamineum* L.
 common
 ✓ 1 42 *Carex*
 rare on open slope
 ✓ 4 43 *Viburnum acerifolium* L.
 local. ~~in~~ in undergrowth.
 ✓ 2 44 *Vaccinium vacillans* Torr.
 common
 ✓ 45 ~~Gal~~

- shrub; fruits very immature.
 shrub; flowers with a
 rather unpleasant odor,
 tube deep pink, limb pale pink.
 tree, (~~specimen~~ specimen from
 lower cauline branchlet)
 shrub.
 shrub 1.5 m. tall, buds
 pinkish
 shrub 1 m. tall,
 buds pinkish,
 broken tree 20 cm. dbh.
 sparse scraggly tree,
 shrub 3.5 m. tall, sterile.
 shrub 1 m. tall; sterile.
 diffusely branched shrub
 1 m. tall; leaves glaucous
 beneath; flowers white.
 shrub 1.5 m. tall;
 flowers white.
 20-30 cm. tall, leaves glaucous
 beneath, corollas whitish.

- 43645 *Gaylussacia baccata* (Wang.)
 ✓ 6 common, locally abundant
 46 *Robinia pseudo-acacia* L.
 locally common on lower
 slopes just above water

with
 P. B. Dowling
 ↓

- 47 *Diospyros virginiana* L.
 rare, one seen
 ✓ 48 *Rubus* cf. *argutus*
 ✓ 49 *Rubus phoenicolasius*
 ✓ 50 *Tipularia discolor*
 ✓ 51 *Onoclea sensibilis* L.
 abundant on small delta
 at mouth of ravine just above
 water

K. Koch.

- shrub 30-40 cm. tall.
 — flowers reddish green.
 shrub 1.5 m. tall, flowers
 fragrant, racemes drooping,
 calyx bronze, corolla white.

sapling 1.5 m. tall.

- canes erect, flowers white.
 — leaves white beneath.
 — leaf purple beneath

May 18 - Wildcat Mt. Preserve
at east base of Watery
(Wildcat) Mt.

Young *Pinus virginiana*
forest, to about 4 m. tall,
with some admixture
of *Diospyros virginiana*
saplings. Density of
forest irregular, from
closed to somewhat open.

Plants seen

- a *Rubus* sp. cf. *flagellaris*
- o *Rubus* sp. cf. *argutus*
canes scrambling in pines.
- a *Desmodium* sp.
- c *Daucus carota* (2)
- c *Apocynum cannabinum*
- o *Triosteum*
- o *Cercis canadensis*
- c *Fragaria*
- r *Viburnum prunifolium*
- o *Antennaria parlinii*
- o *Oxalis corniculata*
- o *Rosa* sp.
- o *Vitis* sp.
- o *Vitis* sp.
- o *Sassafras* (2 m)
- o *Parthenocissus quinquefolia*
- r *Crataegus* cf. *crus-galli*
- o *Cornus florida*
- r *Quercus* cf. *velutina*
- r *Rhus glabra*
- r *Ranunculus bulbosus*
- l *Antennaria plantaginifolia*

Pine forest 20-25 m. tall
on lower slopes, spacing
3-5 m. but many trees
dead, either standing or
blown down, locally, in
these places forest very open,
here many very small
pine seedlings growing through
several inches of litter.

In one pine tree a crow's nest
with a fully feathered
young crow.

Plants seen

- l *Pinus virginiana*
- r *Pinus rigida*
- c *Sassafras albidum* (1-2 m)
- c *Carya* sp. (0.5-2 m)
- o *Diospyros virginiana* (2 m)
- o la *Cornus florida* (2-4 m)
- o *Desmodium* spp.
- la *Parthenocissus quinquefolia*
- la *Lonicera japonica*
- o *Clematis* sp.
- o *Rubus* sp.
- o la *Rhus toxicodendron*
- o *Prunus serotina* (1 m)
- r *Prunus* sp. (5 m)
- o *Cercis canadensis*
- o *Smilax racemosa*
- l *Celastrus scandens*
- o *Rosa caroliniana*
- r *Botrychium virginianum*
- r *Utricularia sessilifolia*
- r *Cynoglossum virginianum*
- r *Arisaema atrorubens*

- ~ *Fraxinus americana* (1-2 m)
- ~ *Lonicera rotundifolia*
- ~ *Lonicera glauca*
- a *Galium pilosum*
- ~ *Galium aparine*

May 13 - Wildcat Mt. Reserve
open roadbank on top
of mountain

43652

Viola

✓ 1

in thin grass

✓ 1

53

Viola

in thin grass

same - in ^{old} pine forest at
east base of mountain

✓ 1

54

Rhus toxicodendron L.

very common on floor
of forest, ~~half~~ stems
creeping under litter.

✓ 2

55

Smilacina racemosa
occasional

✓ 1

56

Prunus

rare

✓ 1

57

Botrychium

rare

✓ 1

58

Rosa

occasional

✓ 1

59

Chimaphila maculata

common

✓ 1

60

Utricularia sessilis

rare, one tiny colony seen

petals deep violet

petals pale violet.

stems creeping, extensive
flowers yellow-green.

stem arching, leaves
appearing distichous,
flowers white.

sapling 1.5 m. tall; sterile.

shrub 40 cm. tall, fruit scarlet.

leaves dark green,
veins white above, purple beneath.
flower pale green.

- same - in young
Pinus virginiana stand 4 m.
at east base of mountain
- 43661 *Antennaria plantaginifolia*
✓1 very local
- ✓2 62 *Crataegus crus-galli*
rare
- ✓3 63 *Antennaria parlinii*
very local
- ✓1 64 *Ranunculus bulbosus* L.
rare
- ✓2 65 *Rosa*
occasional
- ✓1 66 (fungus)
parasitic on *Rubus* (43667)
- ✓1 67 *Rubus*
common
- ✓3 68 *Vaccinium stamineum*
rare
- ✓3 69 *Rubus*
occasional
- ✓1 70 *Carex*
rare
- ✓3 71 *Rubus*
occasional ~~in small clearing~~
- same - in small clearing
- ✓2 72 *Ranunculus bulbosus* L.
occasional in grass
- ✓1 73 *Lesquerhynchium*
rare
- ✓1 74 *Rubus*
occasional
- ✓1 75 *Rubus*
occasional

tall

spreading by rhizomes,
only staminate plants seen.
shrub 2 m. tall; sterile.

spreading by rhizomes,
only pistillate plants seen.
petals yellow.

shrub almost 1 m. tall, almost
unbranched; bud only.
bright orange.

flowering branchlets erect.

shrub 1 m. tall, flowers white.

~~canes~~ canes erect, to 1 m. tall
opposite, flowers white,
culms spreading.

canes ascending to 1 m.,
then scrambling in pine
branches; petals white.

petals yellow; hard ~~to~~ ^{corolla}
at base of stem.
flower bluish

canes ascending, flowers white.

canes ascending, flowers white.

- 43676 *Senecio*
✓ 1 occasional
- ✓ 1 77 *Rubus*
occasional
- ✓ 1 78 *Triostema perfoliatum*
occasional
- 15 79 *Potentilla*
common
- 12 80 *Rubus*
rare
- ✓ 1 81 *Plantago virginiana*
common in bare soil in path
- same in cleared roadside
- ✓ 2 82 *Rubus*
~~common~~, common
- 14 83 *Fragaria*
very common
- 12 84 *Poa compressa*
common
- ✓ 1 85 *Galium aparine*
occasional
- ✓ 5 86 *Rubus*
common

with
P.B. Down

- ✓ 1 87 *Dryopteris marginalis*
- ✓ 1 88 ~~Anemone~~ *Thalictrum thalictroides*
- ✓ 1 89 *Oxalis corniculata*
- ✓ 1 90 *Botrychium virginianum*
- ✓ 1 91 *Polygonatum biflorum*
- ✓ 1 92 *Zizia*?

heads yellow.

canes ascending; flowers white.

erect. flowers carmine or light maroon.

stems almost erect,
petals bright yellow.
slightly emarginate.
canes erect, flowers white.

canes low, tending
to elongate and root at
tips; petals white.
fruit almost ripe.

bluish green

stems erect but weak.

stems almost prostrate,
tending to root at tips,
flowering branchlets ascending,
petals white.

petals white & green.
petals yellow.

flowers white with green tips.
flowers yellow

60

1963 Virginia

May 18 - 4.5 mile south
of Gainesville

47693

Isatis tinctoria L.

✓ 1

common very locally
on remnant of small
hill between lanes of highway

Prince William Co.

61

flowers yellow; fruit
immature.

May 19 - Scientists' Cliffs

Laurel Preserve.

Dissected area of mixed *Quercus prinus*, *alba*, *rubra*, *Acer rubrum*, some *Pinus virginiana* and *Prigida*, with a dense understory of *Kalmia latifolia*, some *Ilex opaca*.

Camp of

Gravatt is opening this up along the road, taking out some of all of the trees to encourage the Laurel.

In ravines the *Kalmia* reaches 5m tall, 20cm+ dbh. Some is in bloom but mostly in bud.

May 19 Hellen Creek Preserve

A small ground fire burned along the brink of the escarpment above the road some weeks ago. A few sapling *Ilex* and seedlings of various other trees killed. In one area a number of larger pines are killed.

The slope above the tributary on west boundary was burned, not heavily enough to burn trees, but the *Kalmia* is dead to the ground and not sprouting yet.

In the flat bed of the tributary, a tangle of *Smilax rotundifolia*, the *Smilax* is killed to the ground but there are some sprouts to 30cm.

On top, in old field, most of saplings were killed to ground. *Vaccinium*, *Nyssa*, *Juniperus serotina*, *Camparis*, *Rhus copallina* are all sprouting.

May 19 - Hellen Creek Preserve

in second-growth mixed
deciduous forest43694 *Epifagus*

✓ 1

occasional under large
beech tree✓ 3 95 *Pyrus malus* L.

near old ruined house

✓ 1 96 *Pyrus communis* L.

near old ruined house

✓ 1 97 *Asplenium* ~~platyneuron~~ ^{(L.) Kuhn}

abundant locally

✓ 3 98 *Vaccinium stamineum*

rare

✓ 2 99 *Kalmia latifolia*common locally, forming
an undergrowth.~~700 *Crataegus*~~rare in
same - in ^{open} cut-over*Pinus virginiana* woods✓ 4 700 *Crataegus*

rare

✓ 4 701 *Ilex opaca* L.

common

✓ 3 02 *Lepidium*

very local in path

✓ 2 03 *Arabis lyrata* ?

very local

✓ 5 04 *Gaylussacia frondosa*

rare

small, very gnarled
tree, fruits immature.shrub, branches tend to
turn downward; sterile.fertile fronds strictly
erect, sterile depressed.shrub 1 m. tall; flowers
white.shrub 2 m. tall; flowers
very pale pink; anthers
very dark maroon.shrub 1.5 m. tall, ^{petals} ~~flowers~~
white, filaments white,
anthers purple.shrub 3 m. tall; flowers
white (staminate), fragrant,
erect.slender shrub 0.7 m. tall,
flowers ~~orange~~ pinkish.

with
P.B. Dowling

- same - in marsh
along stream
- X 43705 *Scirpus*
X₁ 06 *Osmunda regalis*
X₂ 07 *Crataegus*
in edge of marsh
- X₁ 08 *Rosa palustris*
X₁ 09 *Carex*
X₁ 10 *Carex*
X₂ 11 *Carex*

May 19 - near ^{Bowen} Bowen
3 mi. s.w. of Prince Frederick
in sandy soil along
road.

- X₃ 12 *Coreopsis*
abundant along road
and in dwelling yard,
probably naturalized.
- X₄ 13 *Tephrosia virginiana*
common

stems terete

shrub; petals and filaments
white; anthers purple.
shrub; fruit red.

caespitose

rays bright chrome
yellow, disk deeper yellow.

caespitose, stems
strongly ascending,
corolla with standard
pale green, wing, rose
pink, keel bronze.

May 26. - Great Falls Park

Swampy land with
Acer rubrum, Liriodendron,
and Quercus palustris, Ulmus americana
in tree layer about 30 m.

Shrub layer 2-3 m.

- Cornus florida* a of *Lindera benzoin*
a *Viburnum dentatum*
n *Sambucus canadensis*
o *Ilex verticillata*?
n *Asimina*
Herb layer

- a *Symplocarpus foetida*
c la *Podophyllum peltatum*
o *Viola*
c *Ranunculus abortivus*
o *Ansaema triphyllum*
o *Carex*
c *Carex stipata*
o *Carex*
n *Medeola virginiana*
c *Polystichum acrostichoides*
c *Dryopteris cristata*
c *Dryopteris "spinulosa"*
ac *Galium triflorum*
o *Oxoclea sensibilis*
o *Smilacina racemosa*
o *Athyrium filix-femina*
c *Brickellia cylindrica*
c *Cinna arundinacea*
c *Saururus cernuus*
a *Carex radiata*
o *Gerum* sp.?

*Osmunda
regalis*
*Osmunda
cinnamomea*
*Thelypteris
palustris*
*Potamogeton
dissectus*

vines

- a *Lonicera japonica*
c *Rhus Toxicodendron*
c *Smilax rotundifolia*
c *Parthenocissus quinquefolia*

They have just cut a
60 ft swath across this for
the Difficult Run sewer.
The soil is a black heavy
clay. They are filling
in here with broken rock.
A 1 ft tile lets water through
the fill.

This crosser and makes
a right angle turning
up the river. The 60 foot
swath skirts the edge of
the swamp, more or less
following the road.
Part of this has just been
cleared, part not yet.

In flower - not in swamp
Kalmia latifolia
Lysichiton aquatilis
Vaccinium myrtillus
Chelidonium minus?

May 26 - Great Falls Preserve
in Acer rubrum swamp

- 43714 *Ranunculus abortivus*
X 2 very common
- X 15 *Carex*
rare
- X 1 16 *Cardamine*
rare
- X 1 17 *Viola cucullata* Ait.
occasional
- X 10 18 *Dryopteris "spinulosa"*
common
- X 3 19 *Carex*
rare
- X 4 20 *Dryopteris cristata*
common
- X 4 21 *Arisaema triphyllum* L. (n. str.)
very local
- X 4 22 *Carex cf. stipata*
common
- same - in deciduous
woods ~~near~~ on gentle slope
- X 2 23 *Hieracium venosum*
occasional in rocky ground
- X 4 24 *Viburnum acerifolium* L.
very common
- X 4 25 *Chionanthus virginiana*
very local
- X 2 26 *Carex*
common

erect or almost so.

culms spreading; herbage
very slightly glaucous.
flowers white

flowers light violet

small tufts, culms
ascending.
fronds erect

sheaths and petioles
mottled, leaves not
glaucous beneath,
inside of spathe limb
almost black.
loose tufts, culms
spreading.

leaf veins reddish,
flowers yellow.
shrub 1-2 m. tall,
flowers white.
shrub 3 m. tall.

tufted, culms weak.

June 1 - Scientists' Cliffs
on earth cliff along trail
just above bay shore

- ✓ 43727 *Equisetum hiemale* L.
dense patch on seepy
area near base of cliff
✓ 28 *Luzula*
common on more open parts
of bank

June 2 - Scientists' Cliffs
in mixed deciduous
forest on flat ground

- ✓ 29 *Dennstaedtia punctilobula*
occasional
✓ 30 *Thelypteris noveboracensis*
locally common
✓ 31 *Hedyotis purpurea* (L.) T. & G.
rare

June 5 - Scientists Cliffs
(near glass house)

on slopes of ravine
in deciduous second-growth forest

- ✓ 32 *Luzula bulbosa*
common
✓ 33 *Polystichum acrostichoides*
locally abundant
✓ 34 *Carex*
locally common
✓ 35 *Mitchella repens*
very local
✓ 36 *Bryum Mnium cuspidatum* Hedw.
local

densely caespitose, stems
strictly erect.

tufts, culms spreading
transcending.

rhizomes prostrate, buried

forming patches, rhizomes
prostrate, buried.
flowers lavender

tufted, culms spreading.

loose tufts, culms
weak, almost procumbent.

forming local cushions.

437 37 same - flat ground
on bottom of ravine
X1 *Athyrium? Lilix-femina* (L.)
local colony on

ROTH

same - ^m flat ground
in ~~deciduous~~ deciduous
second - growth forest
X3 38 *Carex*
very local

X4 39 *Vaccinium atrocereum?*
common

same - in open *Pinus*
virginiana woods.
X1 40 *Pinus taeda*
occasional

X2 41 *Myrica cerifera*
rare

same - in mixed deciduous
forest with a little pine,
X4 42 *Diospyros virginiana* L.
rare

X5 43 *Quercus falcata*
occasional

X 44 ~~*Quercus alba*~~

X3 43a *Cornus florida* L.
in understory

X3 43b *Quercus alba* L.

small tufts, very loose,
lower sheaths carmine,
culms spreading.
shrub 1.5 m. tall,
fruit immature, not
glaucous.

tree 25 m. tall, 25 cm. dbh.

shrub ~~300~~ 2 m. tall;
sterile.

small tree 6-7 m. tall,
flowers cream-white.
tree 10 m. tall.

tree

tall shrub

tree

1963 - Maryland

June 2 - Laurel Preserve,
Lientists CliffsDeciduous forest on
sloping ground in dissected
area (1) - canopy nearly
complete, perhaps 80%,
spacing 3 or 4 m. Trees 30-75
rarely 120 cm dbh.

Canopy layer:

*Liriodendron**Quercus prinus**Quercus rubra**Carya* sp.*Quercus alba* (one 9' circ.)

Second story

*Cornus florida**Acer rubrum**Carpinus**Ilex opaca*~~Dwarf~~ Shrub layer (saplings)*Quercus alba**Acer rubrum**Aralia spinosa**Carya* sp.*Carpinus**Quercus* sp. (black oak of some kind)

Dwarf shrub layer

o *Quercus alba*v.c *Acer rubrum**Aralia spinosa*c *Carya* sp.c *Carpinus**Quercus* sp.c *Sassafras*o *Vitis* sp.o *Cornus florida*c *Vaccinium vacillans* (7 ft.)tc *Juniperus virginiana*

very few herbs

Desmodium sp.o *Solidago caesia*a *Goodyera pubescens*o *Galium circaezans*o *Smilax*o *Ilex opaca**Parthenocissus**Galium*o *Rhus toxicodendron*o *Quercus prinus*o *Galatrum scandens* (s)o *Panicum* 2 spp.c ~~Low~~ *Carex* sp.o *Euphorbia corollata*o *Cunila origanoides*o *Chromola maculata*a *Cypripedium virginianum*Herbaceous growth extremely
sparse and scattered among dwarf
shrub layer. Perhaps 50-60%

bare ground in dwarf shrub layer.

Second story of *Cornus* and *Ilex* - large sapling of other trees, *Acer carpinus* especially; does not cover more than 30-40 % of ground.

This is on a slope of about 30 % down to a deep ravine. This is on dissected ground ~~cut by~~ such ravines as this.

Largest trees mostly on interfluvies bet. ravines, though on slopes such as these there are trees 30-40 cm. diam.

Bare ground covered by a continuous layer of dead leaves, mostly oak, especially *Q. rubra*, *Q. alba*, ~~some~~ *Q. velutina*.

Locally some low shrubs of *Kalmia*, only on upper edges of slope, on break bet. interfluvies and ravines, poorly developed here. Locally some shrubs of *Sassafras* to 3 m. tall to 3 cm. dbh. Small patch *Epigaea* just below top of slope, and a patch of *Hepatica* spreading from old garbage dump. 1 standing dead chestnut

measuring 12 ft. in circumference.

Area just across boundary road from Miss Glass' house. Mixed second growth, approximately equal parts, but ~~unevenly~~ ^{irregularly} distributed, of *Liriodendron*, *Liquidambar*, and *Acer rubrum*, a few *Quercus falcata*, *Q. prinus*, *Q. alba*, at least *Prunus virginiana*.

Canopy varying from complete to fairly open. Maximum size tulip trees 50 cm. circumference.

Second story of
Cornus florida
Acer rubrum
Ilex opaca
Nyssa

second story almost as complete cover as canopy layer.

Shrub layer 0.5-3 m. fairly well dev., uneven, composed of small *Acer rubrum*, small *Asimina*, *Nyssa*, *Vaccinium stamineum*, *Vaccinium cf. atrococcum*, small *Quercus alba* and *Cornus serotina*, also *Carya sp.*, *Cornus florida*, *Quercus*.

pinus, 1 sapling 2 m. tall
In canopy at least, large
Qu. alba, ~~on~~

in second story one small
Quercus marilandica, some
smaller ones in shrub layer

- l Antennaria plantaginifolia
- r Asplenium platyneuron
- v.l Polygonatum biflorum
- c Quercus spp. (seedlings)
- c Prunus serotina
- e Cornus florida
- c Ilex opaca
- la Polystichum acrostichoides
(on sides of ravine)
- Carya sp. (lower shrub layer)
- o Luzula on sides of ravine
- o Carex " "
- c Prenanthes sp. seedlings
- o Potentilla cf. simplex
- l Smilax rotundifolia in bottom of ravine
- c Quercus prinus seedlings
- o Lonicera japonica
- la Prunus serotina seedlings on sides of ravine
- o Parthenocissus quinquefolia
- o Vitis cf. aestivalis seedlings sides of ravine
- e Carex sp. " "
- l Michella repens
- lc Rhus toxicodendron
- o Amelanchier cf. arborea

- o Kalmia latifolia in ravine
- c Lonicera japonica common lower in
ravine
- r Viburnum acerifolium bottom of ravine
- l Podophyllum peltatum where ravine
bottom is broad
- l Arisaema atrorubens
- r Desmodium sp. var. bottom
- o Aster macrophyllum? " "
- r Euonymus americana " "
- l Athyrium filix-femina " "
- l Asimina triloba (2m) " "
- r Diospyros virginiana (1.5m)

Area on opposite side of
ravine from Miss Glass' house
is dominated by Pinus
virginiana spaced from 1-4
m. apart, medium sized,
7-25 cm dbh and about 20-25 m
high, canopy thin, crowns
narrow foliage rather sparse.
Many smaller pines & some
larger ones have been blown
down by wind some time
ago, as they are fairly well
rotted. A few scattered
small Liriodendron
reaching into canopy,
otherwise canopy is pine.
A single Quercus cf. marilandica
reaches canopy. Second
story scarcely developed -
a few Quercus cf. marilandica

about 4 m. tall; shrub layer to 4 m quite sparse, uneven, *Kalmia latifolia* common but by no means forms a continuous layer - some *Quercus* cf. *marilandica*, *Q. alba*, *Vaccinium atrocium*, *Acer rubrum* to 2.5 m., *Gaylussacia baccata* very local, *Myrica* cf. *carifera* one plant seen 3 m., a few small *Ilex opaca*, one or two *Quercus prinus* to 5 m., a few *Cornus florida*. Ground at least 90% bare, but *Cypripedium acaule* locally very common *Chimaphila maculata* locally common, *Mitchella* very local, *Vaccinium vacillans* locally common, a very few tiny seedling pines, nothing above seedling stage. *Carya* sp. up to 1.5 m. not at all common seedlings of *Prunus serotina* local, very small *Lonicera japonica* flowering, locally common; a few seedlings or saplings of *Quercus alba* & *Fagus sylvatica* saplings of *Carpinus* ~~to 1.5 m~~ up to 4 m tall, one 3 cm dbh. locally a few larger

Cornus florida up to 4-5 m., one *Liquidambar* at least 6 m. tall; *Vaccinium stamineum*, occasional fair sized bushes; *Acer rubrum* locally common to 2-3 m. tall; one patch a few m diam where quite a number of fairly large pines have been blown down. Here at least one plant of *Myrica sylvatica*, a number of *Carya* saplings to 2 m; *Carpinus*, *Quercus marilandica*, *Q. alba*, *Cornus* also here, *Parthenocissus*; ~~and a number of~~ *Campsis radicans* locally common; *Rhus toxicodendron* occasional. *Ilex opaca* common, *Acer rubrum* locally abundant, *Rubus*, possibly *R. flagellaris* ~~occasional~~, young plants, rare, one small *Quercus stellata*; ~~off sapling~~ of *Liriodendron*. The west end of area has shrub layer fairly well developed, ~~about~~ at least 60% cover (part inclusion of patch of fallen pines). ground

layer (dwarf shrubs) is less well developed except for a thin scattering of *Lonicera japonica* and small seedlings of *Saxifraga* scattered understory of *Cornus florida* and a few *Liquidambar*; a few seedlings of *Amelanchier* and seedling of *Brunus serotina* common; *Quercus alba* and *Carya* ~~seedlings~~ seedlings common.

westward understory of *Cornus* much more well developed, *Kalmia* much more rare and scattered but still present. Here and there an occasional small *Asimina triloba*, a small patch of *Epigaea repens*. Toward the west end of this area a few *Pinus virginiana* measured

33, 36, 40, 43" in circ. most of them 6-8" dbh or less.

About the western third of this patch should be cut off as a different unit because of well developed shrub layer and open but noticeable second story. Here also

locally *Lonicera japonica* common. A small-leaved *Vitis* ^{prob. muscadine} but only young plants, *Lamium radicans*, small *Asimina*, *Rhus Toxicodendron* and *Nyssa sylvatica* seedlings occasional, one or two suppressed *Juniperus virginiana*; quite a few fallen pines; one *Nyssa* 6-7 m. tall.

One of Mann's areas marked 6 (indicated by my no. 5) the general forest is completely deciduous or with only a very occasional pine (*P. virginiana*) - flat with deep ravines cut in it. Forest of oaks of several species, more *Q. prinus* than anything else but also *Q. rubra*, *Liriodendron*, *Acer rubrum*; one dead chestnut measured 12' 4" circum.

Forest on flatland has trees varying size 10-50 cm. dbh up to at least 30 m. tall. A fairly well developed understory of *Quercus prinus*, *Acer rubrum*, *Carya* sp., *Ilex opaca* - covering at least 50% of ground.

June 14 - Avon, near Fontainebleau
~~in green~~ cultivated

437441

X1

manettia?

X1

45

Nephrolepis

in greenhouse (plant
 from tuber brought from
 Jos, Nigeria, in 1959.

June 15 - Flight Only - Rome
 Boeing jet, at side. takeoff 8:53
 cloudy so that nothing
 could be seen until 9:20 when
 breaks in cloud layer shows
 principally a pattern of
 green cultivation and small
 areas of forest. Cloud layer
 changed gradually to abundant
 but scattered small cumuli.
 9:23 - pasture and cultivation
 with some hedges. 9:26 clouds
 closed again. 9:31 several
 snow-capped peaks show
 through clouds, and green
 slopes below them - dark drab green.
 Some peaks show through clouds
 in distance. 9:34 Parallel
 valleys, green and cultivated
 across course. Then clouds.
 9:43 Green somewhat
 dissected pastured
 and cultivated country,
 a large muddy river

slender woody twines,
 flowers dull rose purple.
~~fronds~~ fronds ascending-
 spreading from short erect
 rhizome; stolons creeping
 abundantly over ground
 and closely appressed to ground.

running eastward across
 course a compact red-roofed
 town on its banks. 746 forested
 mts 9:47 Riviera coast
 near (40 mi. s.?) Genoa.

From then on over sea, which
 is a beautiful light blue-
 not dark as in tropics.

10:00 Elba - Valley slopes
 wooded, ridges generally
 bare, high summits gray
 and bare, s.e. side around
 harbor, has most of settlement
 and some rather poor-looking
 cultivation.

10:03 Another small high
 island in middle distance
 to right. Slopes are about 30°,
 mostly bare, almost no
 coastal flats or gentle slopes.
 no appearance of habitation,
 slopes mostly rock, little
 vegetation visible at this
 distance.

10:18 crossed an island or peninsula with dry brown low hills, a few patches of dark forest, much congested development along coast.

10:19 shallow water.

10:20 circling around Rome - clouds fairly dense.

Around the airport, at least north of it, is intensively cultivated land, with a strip of wooded or semi-wooded land, mostly small dunes, just back of beach. The densely wooded part has a ~~few~~ ^{continuous} scrub layer, quite green, with widely spaced trees. Some patches of umbrella-shaped stone pines. Some patches of *Ceratonia*. In waste land along air strip many yellow ^{white} composites of a number of kinds. Grass mostly dry, other herbs green.

Rome to Istanbul - R. side of Douglas DC8 - departed 12:43.

[It would be interesting to make an investigation of the American weeds found in the Mediterranean.]

Much residential building along the coast just back of the beach, in the front of the belt of forest. Very cloudy.

visibility zero.

at 1:11 a dry brown east coast (green?) with several muddy rivers running into the sea could be seen. Cloudiness reduced, but position in plane, over wing, made visibility rather inadequate.

at 1:16 we are following an eastward trending coast that soon bends southward.

The country is brown, but with about 30% dark green which must be forest. Serious erosion scars are abundant. This seems to be a large peninsula - small very compact white towns are abundant - most of the dark green is cultivation rather than forest - cultivation is almost 95% of land visible - some may be pasture, not determinable.

Turned south over this peninsula (or island). Then east again (1:27). Clouds.

1:39 a very bare rocky large ~~flat~~ area, then mountains with large snow fields in high valleys. Then a rather extensive area of eroded brown hills, wide dry river beds. Then clouds for

a distance then, 1:48 mountains with some snow, then almost immediately, the sea again.

1:54 A rather narrow brown island or peninsula extending to south. 1:55 another one, this very eroded. Actually these seem to be projections on a rather scalloped coast line, trending southeastward (1:56) with a small irregular island off the coast, culminating in a high sharp mountain with a little snow in ravines. Then the coast returns abruptly northwestward and all we see is sea again, except the top of the mountain over the wing. (1:59).

2:00 An irregular island in dir distance to southeast, fairly large.

2:05 Two brown islands, the nearer one apparently a somewhat dissected volcanic cone. Apparently no forest.

2:08 clouds, no visibility.

2:10 Large low island visible through clouds to south, brown.

2:13 Large island (or mainland) with considerable forest.

Another in distance to south. (This must be the Bosphorus ^{or Bosphorus} with land on both sides visible. Clouds.

2:17 Two mountainous islands in distance - seem to be wooded, but may only be shadow. Another (Is this Sea of Marmara?) ^{farther away}

2:25 Descending over a flat partly grassy, partly built up area, many small islands in seq to right, then circling around toward airport which is on a peninsula. Grassy country extends north to low hills in distance. It is valley rolling rather than flat, and has some trees in depressions, also on low scarps and around small fields.

Landed at 2:30 Hay is piled up in fields along side of airport. Many weeds, plants in flower.

Istanbul - Ankara - same flight. departure 3:30. Visibility not good.

3:36 ahead and to right a large snow-covered range. Many smaller ranges near.

mostly quite wooded.
 3:49 Course swings some to left. Plateau is rugged and beset by mountains, some of them well forested. The general landscape varies from green to tawny, 3:49 some deep ~~so~~ erosion evident. Forest is ~~general~~ on steeper slopes. Flat mesas and other high flat areas are bright green.
 3:49 Far distance is much less mountainous than near town.

3:50 Very rugged eroded dry country surrounding a large complex reservoir. Little evidence of green anywhere here.

3:53 An extensive green plateau with serious ^{white} erosion scars ~~gashed~~ gashed into it.

3:57 Mountains scattered in plateau, no trees, much erosion. Some cultivation on level parts of plateau. A few small villages.

4:03 Toward Ankara much less erosion. Landscape treeless except in city of Ankara and ravine bottoms running into it. Several small reservoirs. Ravine

and narrow valley bottoms have trees - Salix? Populus? Area toward airport level and very green. Many herbs in flower. Outside of airport quite colorful. Many of them are legumes ^{and} ~~and~~ ^{composites} and Ankara-Tehran - same

flight, right side. Departed 5 p.m. Valley around Ankara airport is thoroughly cultivated. Tops of erosion remnants around it also. Slopes of these grassy patches yellow or orange from flowers. Soil quite varied in color, buff to red or purplish red. Chocolate in valley. Eastward much gray rock is exposed on the hills. Landscape continues to be treeless except in bottoms of deepest valleys. 5:06 serious gully erosion. Crossed a wide muddy river.

Mountains are rather gentle in their contours, ridges rounded. Much cultivation in broad valleys, but people concentrated in rather large villages. Country more dissected eastward, much gully erosion locally. Long parallel valleys, sides cut into parallel gullies. sides of these gullies in places

5:17 Some kind of very large-scale agricultural project occupies the greater part of a wide flat basin - cultivation in long regular strip-like fields. Irregular patchwork cultivation around it. Landscape in general is green except where badly eroded or recently plowed.

5:19 4 snow-capped ranges in distance south & east. Gully erosion becomes much more serious. Some very flat mesas being eaten into peripherally by gullies. Country continues treeless. One white range must be Erzurum.

5:19 Several smaller but high ranges with a little snow to southeast.

5:20 A lake just right of course.

5:22 Country becoming rougher, more eroded.

5:23 Snow in ravines on course, or perhaps white gravel?

Eastward country gets more eroded and rougher. Various mountain ranges in distance. Treeless country.

5:34 Enormous system of wide river beds - visibility

so poor that it is difficult to tell what parts are dry and what parts have water. Country becoming very mountainous and rugged.

5:38 Visibility becoming obscured by a gray, dust-like haze, this extends very high 3500-4000'.

The white stripes on many of these mountains can be nothing but snow banks.

5:49 Combination of setting sun and haze make visibility very poor. Brown, treeless country with broad watercourses. Less mountainous here.

5:50 A broad braided river bed crosses course from south. Some water in it.

5:52 Another, but this forms an angle, e-w. to s.w.e.

5:58 Extensive snow-fields just to right of course - plateau-like peaks.

- 43746
1 June 15 - Ankara airport, Ankara, Turkey
Melilotus
abundant on waste areas
near runways.

- 47 June 17 - New Delhi, near
India International Center
Prosopis
common tree in waste spots.

- ~~43747~~
1 48 June 22 - 11 mile above Gauhati
toward Shillong, Assam
Emilia sonchifolia (L.) DC.
rare on vertical earth
cut above road, among other weeds.

- 2 49 June 23 - Shillong
in weedy spots in gardens
of the Pinewood Hotel.
Galinsoga
common
4 50 *Drymaria ~~hirsuta~~ villosa* C. & S.
locally abundant

branched from base,
stems almost erect.
flowers bright yellow.

spreading tree 9 m. tall,
leaves closed when collected
at 6:30 p.m. Flowers yellow.
fruit ~~so~~ thick, oblong
in cross section.

flowers purple.

5000'
1575m.

rays white, disk yellow,
erect; petals white.

June 16⁻¹⁸ New Delhi

Plants seen

| | |
|------------------------------|-----|
| Prosopis | + |
| Azadirachta indica | * + |
| Kigelia pinnata | * c |
| Picinus communis | + |
| Lawsonia inermis | c |
| Ficus religiosa | * c |
| Amorpha donax | ? |
| Livistona chinensis | c |
| Grevillea robusta | c |
| Ficus benghalensis | * c |
| Lagerstroemia indica | c |
| Thevetia peruviana | c |
| Hamelia patens | c |
| Nerium oleander | c |
| Euphorbia spathulata | c |
| Eugenia cumini | * c |
| Jatropha | c |
| Cassia fistula | c |
| Zehneria pendula | c |
| Plumeria obtusa | c |
| Caesalpinia pulcherrima | c |
| Kochia scoparia | c |
| Zehneria pendula | |
| Cynodon dactylon | + |
| Jacaranda mimosaefolia | c |
| Pithecollobium unguis-cati ? | c |
| Celastrus pentandrus | c |
| Delonix regia | c |
| Tabernaemontana divaricata ? | c |
| Dianthus caryophyllus | c |
| Asparagus sprengeri | c |
| Portulaca grandiflora | c |

Azadirachta is very common
Kigelia, & Ficus religiosa
also common. Eugenia cumini
also

Ficus religiosa called "peepul"
The Plumeria obtusa is a
form with ^{slightly} small
leaves, very venulose
leaves, emarginate at apex,
and corolla lobes much
narrower than usual.
Pleasantly fragrant white
with yellow center.

The jatropha has cymes
of flowers on long peduncles,
flowers 1-1.5 cm. across, crimson.
Leaves oblanceolate to oblong-
obovate.

Santana camara is a white
form with yellow eye, no prickles.

* common street trees

| | |
|---------------------------------|----|
| <i>Bougainvillea glabra</i> | c |
| <i>Decas stans</i> | c |
| <i>Duranta repens</i> | c |
| <i>Murraya paniculata</i> ? | c |
| <i>Lantana camara</i> | c |
| <i>Schinus terebinthifolius</i> | c |
| <i>Tridax procumbens</i> | s |
| <i>Erigeron bonariensis</i> | s |
| <i>Prunus persica</i> | c |
| <i>Antigonon leptopus</i> | c |
| <i>Campsis radicans</i> | c |
| <i>Prunus armeniaca</i> | c |
| <i>Gerbera jamesonii</i> | c |
| <i>Pyraea revoluta</i> | c |
| <i>Alternanthera versicolor</i> | c |
| <i>Hymenocallis littoralis</i> | c |
| <i>Asparagus plumosus</i> | c |
| <i>Zinnia elegans</i> | c |
| <i>Amaranthus viridis</i> | s |
| <i>Quisqualis indica</i> | c |
| <i>Sporobolus fistulosus</i> | ca |
| <i>Rhoeo spathacea</i> | c |
| <i>Helianthus annuus</i> | c |
| <i>Dodonaea viscosa</i> | |
| <i>Conyocarpus pinnata</i> | |
| <i>Impatiens balsamina</i> | |
| <i>Catharanthus roseus</i> | |
| <i>Phoenix dactylifera</i> | |
| <i>Gomphrena globosa</i> | |
| <i>Gaillardia picta</i> | |

June 19 - bus trip Delhi to
Dehra Dun

Just outside Delhi, to
north, bet. highway and railway
is a broad vacant area,
apparently a part of the river
bed, with scattered bushes
and mats of herbaceous
plants. Some seeps of
water - laundry spread out
to dry, trucks removing earth, etc.

River bottom-land largely
occupied by water-melon fields,
used year after year. Flooded.

Vultures common outside
city, crows also.

Prosopis seems to be the
commonest wild tree
in the area near the river.

Young trees on these flats
protected either by iron
cages or by open circular
walls built of bricks.

Calotropis procera is
very general along road and
in waste places. What
appears to be *Paspalum*
distichum generally
abundant. Marshy places,
some of them saline, and
ponds frequent. Highway
runs between railway
embankment and river

on low flat land. Large
irrigation canal. Indian
buffalo common. *Ipomoea*
fistulosa common locally
Some patches of what
appears to be young suga cane,
though rather too dark green.

Roadside ditches with
filthy water. Land all
checked for irrigation.
Considerable maize.
Suga becomes rapidly
more abundant. Mangroes
common. Marshes and
ponds much ~~the~~ less
common. Then more so
in apparently alkaline
area mostly not cult.

Recent large irrigation
canal.

Generally open country,
very flat, some trees,
esp. mangos, miscellaneous
cultivation, considerable
suga cane. Soil removed
locally for brick clay.

Road lined all the way
from Delhi by neem and
Prosopis (?) trees, numbered.

Modi Nagar

Canal with little water,
much *Eichhornia*.

Date trees scattered locally (prob. introduced during Mogul times).

Considerable sugar cane and maize, a little cotton. Carica.

Beehive shaped piles of cow manure. (for burning).

Areas of alkaline marsh - Atriplex? Proboscium distichum?

Fences of a small agave.

Ipomoea fistulosa continues abundant locally along road.

32 mi. n. Delhi

Much standing water generally, esp. near highway. Crossed railway.

Parts of land apparently too alkaline for cultivation, covered by a very thin, very short grass.

Meerut - some small citrus orchards.

Abundant Carica.

Some mango orchards.

Northward the country tends to be more open, larger fields. Larger checks with higher levees.

45 mi. northward road lined by thickets of small Phoenix, between trees.

Agave hedges frequent, too

Trees, mostly Pongamia (?) numbered on wood in small window cut in bark. Numbers run between milestones separate series on opposite sides of road. Usually somewhat over 100 per mile on each side.

Cultivation mostly cane, some Vigna, mango orchards, maize.

Lakhotitanda 53 mi.

Scattered trees and small patches of trees in field landscape.

Khatauli

Some bananas. Carica, many mangoes. Ornamentals.

Large irrigation canal.

Trees in this area have been numbered, but the numbers no longer show. Most of cultivation is cane.

A few hedges of an Opuntia resembling O. dillenii in places mixed with Agave.

Peach orchards, & peaches mixed with mangoes.

48 mi. Ground becomes slightly rolling. No cane on rolling

land. Reappears where it is flat again.

10 mi. + many orchards.

Mussafarnagar

A spiny *Pithecellobium*, *Hibiscus* hybrid, 'Guava' orchard, beside the ordinary things in this town.

Much brick made in this area, resulting in large areas of excavation about 1.5 - 2 m. deep.

Sugar cane + cow peas cult. north of here. A few teak among trees lining road. Numbers here painted on ~~the~~ metal plates nailed in trees.

69-70 mi. s. of Dehra Dun

Some cotton. much fallow land, some cane.

Ditches and large ponds choked with *Eichhornia* some rolling land.

These rolling places may be small areas of loess or caked dune sand.

Land well checked, some of it flooded.

63 - D.D.

Much flooded cane land.

Trees locally abundant, mostly mango + *Eugenia cumini*.

D.D. 59 mi.

Burgaz - mostly mud houses with thatch roofs.

Mango orchards.

D.D. 57 mi.

Sugar cane, but low hills or rolling ground in distance to it. nearly bare and brown. - no, perhaps it is a ditch bank.

Many trees in landscape beyond ditch.

Much *Euphorbia spathulata* in hedges.

Crossed ditch, which is a huge canal.

Mango trees very abundant around town on other side.

Large mango orchards beyond.

100 mi from Delhi, 47 D.D.

Beyond this - cane land and orchard, mostly mango.

~~Root~~ Roopkee - large place.

Many large mango trees. *Lantana camara* hedges. *Ipomoea cairica* on fences. *Pithecellobium dulce* common.

Cane land largely fallow

170 mi. Slightly rolling land. Mud village. Thin mango orchards. ~~goss~~ *Fatouha gossypifolia* hedge.

174 mi. Cane land, much of it fallow, some in cow peas, alternating with some mango orchards, local rolling areas.

Commonest tree, Delhi tree is *Dalbergia* of *sissu*?

117 Gently rolling land cut by ravine, partly cultivated. Mango orchards more extensive.

118 Some sugar cane again. A large tufted grass, resembling *Echinochloa* spontaneous common on roadsides and levees. Some *Pennisetum* thick.

124 Crossed small river mixed cultivation, still some cane. A number of new roadside weedy shrubs have appeared.

126 Generally more rolling land. Shallow ravines.

Hedges of *Fantana*, etc.

128 Soil has become rather gravelly. Some mountains visible ahead through dusty haze. Sugar cane has disappeared.

129 Dry open forested area, apparently planted, as trees are in rows. Some clumps of a ragged bamboo interspersed. A thin shrub layer at least near road. Soil very gravelly.

131 Forest denser, trees no longer in rows, semi-deciduous.

132 A road dry wash parallel with road not far from it. Very gravelly, bare.

133 Follow valley of the dry stream into a very rugged range of hills. Covered by semi-open, semi-deciduous forest.

134 Bare cliffs along stream.

135 A very little water in stream.

136 Forest becomes greener and broader leaved, at

fast in canyon bottom.
On higher slopes still
pretty thin.

139 Stream has become
very small and the
canyon not very deep.
Up here the forest is certainly
deciduous, now in young
leaf stage.

139.7 At top road goes through
a tunnel. Then winds
down a similar canyon.
Forest somewhat greener.
Within less than a mile
this widens out into
a flat wooded valley.
Woods seem to be an almost
closed low broad sclerophyll.
Trees are small - forest
looks rather coppice-like.
142 Some cultivation and
some forest plantation.
Then cultivation and
pasture, many trees and
hedges. Flat wide valley
bottom.

Subhar Nagar.

Few trees. Poles along
ditches.

Cannabis common weed.

June 20 - Dehradun
Weeds

Ageratum conyzoides

Apium leptophyllum

Medusa pilosa

Cyperus rotundus

Imperata sp.

Lantana camara

Cannabis sativa

Erigeron bonariensis

Ruminantia communis

Argemone mexicana

Monstera deliciosa

Psidium guajava

Cassia fistula

Litchi chinensis

Cedrela toona

Mangifera

Dalbergia sissoo

Adenanthera pavonina

Ficus benghalensis

Plumeria rubra

June 21 - bus trip Dehra Dun
to Delhi

young forest at base
of range just s. of D.P.
Large termite nests very
conspicuous. Toward mts.
forest is older and larger
more closed. Forest on
slopes is smaller again,
commercial species being
removed while still small.

South slopes - forest
very thin, erosion severe,
mountain low but very
sharp and jagged. River
bed broad, gravelly, bare.
In places a conspicuous, erect,
tufted grass - *Andropogon* sp.??
Large proportion of trees in
forest, esp. on slopes are in
young leaf. Forest on lowest
slopes in *Chios*, *twintae*,
ci stende, thin *Opuntia*
(or *uropalis*) is fairly common.
The *termite* are lacking
on this side.

Except for the forested
Siwalik Range, the
road from D.D. to Delhi
runs through flat
cultivated land, almost
entirely checked with
levees for irrigation by
flooding. Along the road
is an almost continuous
series of ponds, pools and
mudholes that are used
by the buffaloes for bathing.
Some of these are filled
by *Eichhornia*, more not.
The low mud walls or
levees that line the
road are colonized to
form hedges by several
plants - *Ipomoea fistulosa*,
Opuntia cf. *dillenii*, *Agave*,
Sasaparilla (?), *A. caudata*,
Euphorbia *spathulata*,
and many others, differing locally.
These possibly spontaneous
at least in some places
probably planted.

Trees, mostly *Palbergia*
sissou, *Mangifera*, *Eugenia*
cumini, etc. are planted at
5-20 m. intervals on both
sides of the road. All are
numbered. The soil is a
brownish gray cloddy silt.
The crops are mostly

sugar cane, rotated with maize, cow peas and a few other things. Many fields ~~are~~ are fallow just now, and all cane is very young. Apparently it is harvested in Jan-Feb.

The landscape is generally open with scattered trees, clumped around dwellings, orchards common near upper end of road.

Now and then are low hills or knolls of loess or similar material. Around houses and villages are conspicuous bee-hive shaped manure piles often thatched with straw, 3-4 m. high. Houses are made of mud or brick.

Along the road the ^{grass} ~~grasses~~ mostly *Echinochloa* is eaten very close. *Calotropis* is a generally common and conspicuous weed.

Buffalo and humped cattle are very numerous. Birds, esp. crows, mynas, etc. very common. Also small egrets, herons, storks, stilts(?), vultures occasional.

Younger trees are on circular platforms surrounded by deep circular ditches and high linear levees.

The sky is gray with dust, said to be from the Rajasthan Desert, and a hot west ~~west~~ wind is blowing.

Saccharum spontaneum is common locally on levees and roadsides, the clumps in places eaten down. Phoenix sp. also common locally along road. Large trees few, loc (1-2 m) locally abundant.

June 22 - New Delhi to Calcutta -
flight in Viscount at side (see wing)
dep. 6:45. Dusty haze at Delhi.

Visibility not at all good.

7:24 still dusty.

7:34 crossed large river
trending about $30-45^\circ$ w of
course, with a broad
apparently gravelly braided
bed, considerable water,
running through a wide
strip of country that appears,
though visibility is poor
to be uncultivated. Bordering
this is cultivated land.

7:42 Cultivation not evident,
apparently pastures and
small irregular scrub & forest
patches, hedges are dominant.
Dust still notable.

7:58-8:00 apparently a
savanna landscape
with trees very irregularly
distributed. Trees becoming
more abundant, increasing
evidence of cultivation (8:03).

8:05 A small river with
water in it, trending slightly
w. of course, but no apparent
influence on the dry ~~rocky~~
appearance of the landscape.

From here on for some
distance cultivation increases
and trees decrease, but the

general aspect is still dry
and brown. Visibility still
not very good.

8:20 Crossed a very large river
at right angles to course, but well
to right turning almost parallel
to course. Broad gravelly (?) bed,
quite a lot of water, some old
meander pattern.

8:28 More trees evident,
strongly clumped with dry
brown areas between, then (8:24)
trees almost lacking.

Visibility becoming poorer.

8:30 crossed a very large
braided river at rt. angles to
course. General tone of
country has changed to
a dark color instead of
tawny brown - visibility
too poor to determine for certain
if this is due to increase in
woody vegetation but probably so.

8:25 Generally tawny again,
few trees.

8:38 Another large river at
about $60-70^\circ$ w. of course.

8:40 Another, smaller one.

Country generally somewhat
darker in tone. Visibility still poor.

8:55 More vegetation, but visibility poor.

9:00 A mountain visible through
haze to right in distance.

9:02 no visibility
arr. 9:40

June 22 - air trip, Calcutta - Gauhati
in Pakken Friendship Road.

Dep. 11:33

Mostly diffuse villages
and cultivated land.
Trees abundant around
village areas and locally
around cultivated patches.
~~Most~~ cultivated patches
mostly surrounded by
levees - some patches are
flooded individually,
but large areas are
flooded without regard
to field boundaries.

In some areas there are
small patches of trees
in others hedges around
fields.

Circled until 11:37. By this
time thin cloudiness is
obscuring visibility. Consider-
able areas are under water,
but there are not generally
where there are houses.

Landscape generally green.
The submerged areas are
generally treeless.

11:41 Flooding is in longitudinal
strips, apparently ^{old} meanders.

11:43 Same pattern but
visibility fading to nothing.

11:44 Greater portion of ground
flooded, relation to vegetation and

houses not clearly visible.

11:46 flooding patchy.

11:49 Perhaps 75% of land submerged.
intricate system of old
meanders & oxbows.

11:55 Cultivated land, not
flooded, long old meanders
with dark not muddy water.

11:56 Much flooding again.

11:59 Flooding general, even in
roadways between houses.

Then relatively dry land
with only patches flooded.

Visibility almost none.

12:08 Crossed an enormous muddy
river. A few small sandbars
are dry. A large island in it
looks as though it had been
seriously washed over. Now dry,
as is the land on either side
of the river. Clouds again.

12:13 Another very large river
with much flooded ground,
intersection of a large tributary
coming from direction of our course.

12:14 Meanders and cutting off
of meanders. Clouds again.

12:16 Slight thinning of clouds -
a meandering red muddy river
apparently in forest.

12:46 Bumpiness, clouds to great height.
Hill below, but not visible.

12:53 Low hilly country, partly
grassy, very green. Cloudy.

12:51 Large expanse of solid undisturbed forest, hilly, white-water streams.

12:53 A few clearings. Clouds.

12:54 Solid forest again fair sized river crosses course.

12:55 Clearings in forest. Then forest. Apparently Kant. Then villages and cleared areas.

12:56 Cleared land along river, considerable population, forested hills between rivers.

Cultivation appears to be new. But certainly 95% or more of visible land is still forest.

12:57 Large area of rice land. Start descent to Gauhati. Vast areas of rice land, forming a generally square pattern of subdivision.

Small villages in some parts of rice area, surrounded by bamboo.

Other areas with no villages. These are flooded.

Really much water generally.

1:01 Landed.

June 22 - Gauhati.

Plants seen

Eichhornia crassipes
covers ponds, floating in river.

Carica papaya

Melia azadirachta

Helianthus annuus

Thevetia peruviana

incl. a cream fld. form.

Adenanthus pavonius

Cocos nucifera

Mangifera indica

Ficus religiosa

Lamanea saman

Plumeria rubra

Artocarpus heterophyllus

Quisqualis indica

Codiaeum variegatum

Jasminum grandiflorum

Dahlia variabilis

Cyperus rotundus

Petunia

Salvia splendens

Lansia vieira geylanica

Cissus quadrangularis

Psidium guajava

Antirrhinum majus

Acalypha hispida

Euphorbia bojeri (mili?)

Mirabilis jalapa

Diarrhiza coryophyllus

Hymenocallis littoralis

Jasminum sambac

Portulaca grandiflora

Impatiens balsamina

Colocasia esculenta
Lantana camara
Manihot esculenta
Zea mays
Cissia fistula
Crotalaria mucronata
Cariota
Auca catechu
Ficus infectoria
Tectona grandis
Pesbania grandiflora
Oryza sativa
Musa sapientum
Delonix regia
Jatropha curcas
Eclipta alba

Rice land is mostly fallow at this season. Seed beds well up.

Trip by car Gauhati - Shillong
 Lower hills - topography looks like Karst, red soil. Forest nearly destroyed - open ^{tangled} second growth, tangled with bamboo. Moss common, spontaneous.

Plants seen at gate, 11 mi. above Gauhati:

Emilia sonchifolia
Thunbergia alata
Solanum iniquum
Cleome indicus
Portulaca oleracea
Amaranthus viridis
Synedrella nodiflora
Amaranthus spinosus
Monochoria vaginalis
Oxalis corniculata
Chrysopsis aciculatus
Momordica charantia

said to be *Bambusa tulda*

Hill slopes dominated by a clump forming bamboo with arching tips. After about 25 miles the bamboo is still present but other trees are generally dominant, or at least abundant.

June 23 - Shillong, Assam
Pinewoods Hotel is surrounded
by *Pinus*, *Cryptomeria*, and
a profusion of planted ornamentals.

Eupatorium adenophorum
is very common and regarded
as a pest.

E. odoratum is well repre-
sented in the herbarium, as
is *E. rivularis*. *E. wallicianum*?
looks similar.

Lantana camara is also
abundant, a form with rich crimson and yellow
flowers.

Sambucus, possibly
S. mexicana is occasional
in yards.

Pine forests have almost
no second story, but have
a shrub layer very well
developed, of *Lantana* and
Eupatorium. *Glechoma* cf.
linearis common on road cuts
below Shillong. Above it this
was not seen, but a large
one of the *G. japonica* group
is common.

On way to Gauhati the pines ^{and eupatorium}
disappear essentially at about
mile post 53 (from Gauhati)
and definitively at m. p. 49
a small aculeate *Blumea*
appears in scrubby fields just
above here.

June 23 - The Peak, above
Shillong.

This mountain is almost
completely covered by *Pinus*
insularis forest, except for
a few patches of broadleaf
evergreen - *Quercus*, etc.

These are covered with epiphytes.
Trunks, at least, and ferns
are abundant on the ground.

It seems likely that the broadleaf
forest formed most of the original
cover, but that pine has been
favored by selective cutting and
perhaps even much by burning, gradually
leaving an almost pure pine forest.
Acacia mollis is naturalized
and forms thickets and small
bits of forest.

The pine forests are semi-
open to closed have mostly
very little undergrowth.

Photos

Two or three photos (black & color)
but not taken from a very
good place.

At about 54 mi. above Gauhati
on road a hydroelectric dam
is being constructed. It will
flood a fine valley with
considerable rice land.

June 23 - Lawlyngdoh Forest
 Sacred forest of Lyngdoh clan
 photos from distance and
 close up, latter with altar
 and monuments. 6000'
 Has not been cut.

A gnarled montane rain
 forest or mossy forest -
 Canopy very irregular, at
 10-15+ m. high, trees with
 trunks to 4 dm dbh, spaced
 2-4-5 m. A second layer
 of tall shrubs to 5 m. these
 slender and almost
 continuously varying in
 height. Open tall herb
 layer of ferns Dryopteris etc.
 a very low layer of mosses
 Oplismenus, a few ground
 orchids. Oxalis griffithii, Oplismenus
 Trees Litsea

Quercus dealbata
Quercus blanceifolia
Chromolaena impressinervis
Bayera paschii
Schinus khasians
Schinus wallichii
Magnotheria insignis

Mosses and hepatics
 very abundant, but filmy
 ferns rare. *Peperomia reflexa*.
Vaccinium serratum
 an epiphyte with a trunk

of the stem swollen
 and fleshy
 A large *Faxus*, to 15 m. 25 cm dbh
 common.

Forest is about $1\frac{1}{2} \times 2$ sq. mi. in
 area. $1\frac{1}{2}$ mi. long $\frac{1}{2}$ to 1 mi. wide
 on rolling, almost hilly ground.

~~Mawphlang~~

It is situated on a
 rolling rather hilly
 plateau that is
 otherwise entirely
 in bare short grass
 pasture with scattered
 clumps of *Melastoma*
malabathricum.

This forest is regarded
 as sacred by the "Pagan Khasi"
 who will not take a
 stick out of it. However, the
 "Christian Khasis" run
 their cattle and goats
 in it, and although there
 has been little cutting
 of trees, the undergrowth
 shows considerable
 damage.

Photos

Kod. & b+w photos from a distance
 and close-up outside, several
 b+w. inside, but possibly
 underexposed.

June 23 - Lawlingdoh Forest,
just southeast of Nawphlang,
Khasi Hills about 15 mi.
S.E. of Shillong
in mossy broad-leaf
evergreen forest

43751

Ophiorhiza

2

very common

1 52

Pratia begoniaefolia Lindl.

very locally abundant

1 53

Lysimachia?rare in rocky bed of ravine
in ~~sun~~ full sun.

1

54 *Polypodium*~~on tree trunks~~ on tree trunks

1

55 ~~*Polypodium*~~ *Pyrrosia varia* (Kaulf.)

on tree trunks

1

56 *Taxus "baccata"*

occasional

1

57 *Hymenophyllum*

on an occasional tree trunk

6000'

1800 m.



flowers white.

very prostrate; pedicels erect,
flowers purple and white marked;
fruit turning purple.
leaves purplish green;
corolla yellow.

Farwell well off.

tree 10 m. tall, others larger;
sterile.

branches hanging down.

June 24. Trip by car from
Shillong to Gauhati -
(see p. 126 for notes on upper
15 mi. of this road.)

Hilly land, the flat parts
and gentler slopes (less than 30°)
cultivated or ~~is~~ in grass
(*Imperata cylindrica*, frequent)
steeper slopes in poor
irregular scrub, ravines
with thickets. Huts frequent.

A few pines in ~~the~~ thickets
in ravines bet. m.p. 49 & 48.

Mango seems to be the most
important crop on slopes, rice
in ravine & valley bottoms.
Some *Musa - Carica*.

What appears to be *Rhus*
javanica is common on side
of ravines.

A few more pine bet. m.p. 44 & 41.

A little rather ratty
forest ~~on the~~ on steep slopes
around m.p. 43⁹ - 41 - broadleaf
evergreen. Being logged.

Below here *Bambusa tulda*
seems to dominate the slopes.

Just above m.p. 38 is an
ipeacac plantation. The plants
shaded by sloping board structures.

Nongpok - m.p. 29

Vernonia cinerea

Cyperus circinalis

Solanum lyopersicum

This area generally
seems to be a series of hills
of pegmatitic granite
with a deep (2-4 m) layer
of dark red residual or
deposited weathered
material on it. This
often includes boulders
into a huge size of the
same granite. Below m.p. 27
the rock changes to a
fine grained irregularly
banded metamorphic rock.

Canyon bet. ~~26~~ m.p. 26 & 25
has steep walls with
thick forest broad-leaf
with much *Bambusa*.
Cleared in places for
plantations of a *Musa*
with ascending leaves,
possibly ~~the~~ abaca. This
is also common wild.

Much Teak planted
below m.p. 24.

Below about m.p. 17 the
hills tend to be more or less
cleared, though still large
areas are covered by a mixture
of trees and bamboos. Then
less clearing lower down.

In Assam, at least around
Gauhati, the water buffalo
replaces the Indian buffalo.

The Bramaputra at Gauhati, is at least 1 km, perhaps 1 mile wide. It contains quantities of floating vegetable debris, probably mostly *Eichhornia*; steamers and boats of many kinds, muddy water.

Hills bet. Gauhati and airport show home-like exposures of granite.

Colocasia cf. *esculenta* is very abundant in muddy places in and around Gauhati. *Alocasia macrorhiza* ~~are~~ rarely seen.

Jatropha gossypifolia uncommon.

Eichhornia varies tremendously in stature - to nearly 1 m tall.

Crows are the common scavengers in Gauhati - abundant and aggressive. On the outskirts was a large flock, perhaps 100, vultures. The crows were harrying peripheral individuals.

June 24 - flight Gauhati - Calcutta. Friendship. 5:25
The Bramaputra, below Gauhati, is even wider, spreading over a vast area - not clear if this is normal or only because of flood water, but judging by the defined banks, it may well be normal.

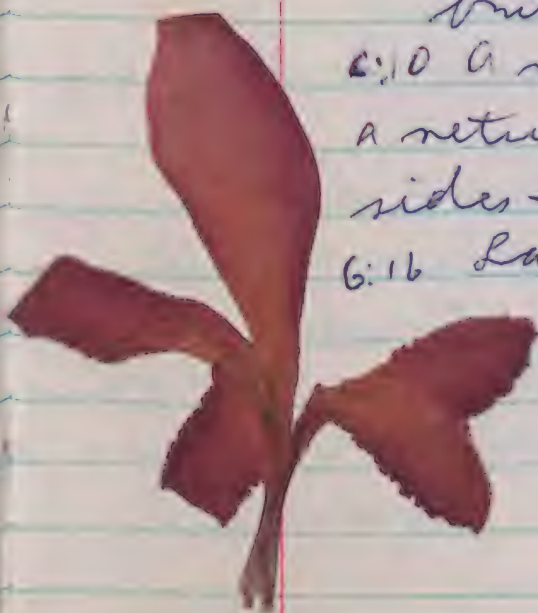
Beyond these banks there are vast areas of flooded land and partially flooded land. Actually it must be more flooded than it seems, as there is somewhat of a patchwork pattern about it, with some squares completely water, others green - probably the grass is merely higher. Many meandering channels.

5:33 visibility zero.

5:38 Hilly country, largely cleared, but visibility bad.

6:10 A vast river on the right, with a network of channels on both sides - no details visible.

6:16 Landscape 90% water.





June 27 - Flight Calcutta -
Singapore. Being 707 at side.

Took off 1:25.

Delta area with extensive
green ^{inundated} rice-land with no
houses or trees, wandering
through them irregular patches
of trees with houses. The
pattern of these is ~~not~~ not
obvious but most are
irregularly elongate.

1:27 a fairly large area that
is high enough not to be
inundated - scattered houses
and patches of trees.

1:28 Area nearer the broad
winding course of the flooded
river is lower and irregularly
flooded.

1:30 Clouds.

1:31 A network of tidal
channels on a gigantic scale
draining into an enormous
river, trending more or less the
same way as the course.

Interfluvies cultivated but tending
to be less so.

1:34 Channels tend to have dark
bands of trees along them and
light green interfluvies.

1:35 Interfluvies become solid
dark green - probably mangrove
swamp - perhaps the Sunderbunds.
Visibility getting worse.

1:38 Crossed the coastline. wooded
to the beach. Just to left are
two enormous estuaries.

June 31 - Singapore -

3 Kod
Photos

looking from Kranji War Cemetery
the general landscape is rough
in all directions, dominated
by coconuts & other trees, but
actually rather open, much
grass (*Imperata*) and cultivation,
bits of rubber plantation.

Grass has taken over the
eroded areas much more
than in 1954.

Ixora chinensis

Portulaca grandiflora

Pentas coccones

Hemigraphis colorata

Crocosmia lanceolata

Mussaenda alba

Beloperone guttata

June 31 Johore Bahru

Back of this town are vast
areas of old rubber planta-
tion with an open growth of
seedling trees. Grass and
Melastoma between trees.

also some areas of rolling
grassland. Patches of thickets.
Then some rather young
plantation, mixed with
areas of thicket - shrubs
about 4 m. tangled with
Melastoma and *Gleichenia*.
Some plantation being replanted.
Plantations are clean-cultivated.

An *Brachn* or *Lanicum* is
abundant where anything
has been allowed to grow.

Also *Paspalum obiculatum*

Pteris sp.

Clidemia hirta

Burmhesia

Lycopodium cernuum

Under some of plantations
the herb growth has been
sprayed and is gray-brown.
Gleichenia on sprayed road-
sides sprouting from rhizome.

About 17 large areas
of ~~low~~ scrub & thicket -
Bumbl says formerly
gambier land. Then small
area of secondary forest.

A few areas of rubber
poisoned for replanting -
bare skeletons. Being cut.
Herb growth dead from spraying.

Kotatinggi - some secondary
forest just outside town,
esp. on rt. of road. Tide
water at least up to here.
Then more rubber in various
stages.

At about m. 31 country gets
hilly and there is considerable
degraded forest on steeper ground,
also thicket or belukar.

Pteridium along road.

Considerable "guencus" in
flower.

Loranthus parasiticus on
rubber - native in forest.

On road to
through low hills - many
patches of forest mixed
with rubber, some of it
rather good.

Some swamp in low places.
Toward coast ~~some~~ more
forest, less clearing, no
rubber. Clearings are
in bananas, maize, etc. mostly
along road.

Kaula Sedili (Jarak Bay)
wide sandy beach,
intertidal, sand flat
back of beach sloping
gradually back to low
swampy land.

The beach ridge occupied
by sparse *Casuarina* forest
only a few yards wide,
ground covered by a
mat of *Thunbergia*, and
Ipomoea virginiana,
Chrysopsis aciculatus,
and, as lower levels are
reached, *Fimbristylis cymosa*.
Shrubs of *Desmodium*
umbellatum, *Glochidion*,
Dillenia, *Pandanus* etc.
with *Casuarina*.

Then a strip of low
grass with *Leersia*.
This grass has *Chrysopsis*,
Digitaria sp., *Fimbristylis*
and sparse *Imperata*.

As forest is approached
sparse shrubs of *Melastoma*,
Eugenia, *Glochidion*, *Ardisia*,
Cerbera, *Desmodium*, etc.

The thickets at edge of
forest are of *Hibiscus* sp.,
Dillenia suffruticosa,
Eugenia sp., *Onocoma*
filamentosa, *Glochidion*,
Cerbera,

? low
photos

actually the forest here is a bit degraded canopy very open, undergrowth thick.

Back across the stream forest stretches for a good distance.

A fair diversity of trees no well developed second story. Shrub layer thick, diverse in species. A number of herbs - *Isleria*, *Zingiber*?,

Deep black-water channels meandering through. Quite a few vines, some prickly.

This forest is very much disturbed - paths everywhere, cut palms, etc.

~~July 1~~

July 1. Bukit Timah - Looked for *Geophila*, but certainly none on the steeper slopes.

Here there is considerable *Calamus* of a small short-stemmed type.

July 2 - flight Singapore
Kuching - (Viscount St. side)
East of city considerable areas of coconut trees.

Islands s.w. of Singapore mostly built up but a considerable area of forest on south side.

Three tiny islands with wave-cut cliffs, scrub vegetation, no buildings.

Then across a considerable channel several large islands completely covered by tank farms.

These islands are the ones in immediate vicinity of Singapore.

A few minutes later several rather large islands on right, appearing somewhat dry, mostly wooded but scrubby, many clearings, especially close to coast.

Then several ~~small~~ farther in distance a large island, with a hook to north almost to coast. Generally a patchwork of forest and clearings in various stages of regrowth.

(to p. 146)

June 30 - between Katatinggi and
Kuala Sedili (Jasin Bay), south Johore

- 43758 *Blechnum stenochlaena palustre* (Burm.) Bedd.
5 occasional at edge of forest

June 30 Kuala Sedili (Jasin Bay) 1 m.
south Johore

on flat of ~~grey~~ white quartz
sand, just back of beach

- 3 59 *Scleria*
common in secondary forest
- 1 60 *Fimbristylis cynosa* R.Br.
very common in open grassland and
- 1 61 *Petungia racemosa* (Roxb.) K. Schum.
occasional in small thickets
- 1 62 *Cyperus* cf. *splacelatus* Rottb.
common in ~~open~~ open grassland
- 3 63 *Uvaria*
in edge of forest
- 2 64 *Cyperus polyanthus*
common locally in grassland
- 2 65 *Ardisia elliptica* Thunb.
common in thickets and edges
of forest
- 3 66 *Glochidion littorale* Bl.
at edge of forest
- 1 67 *Melastoma malabathricum* L.
common in grassland
- 3 68 *Desmodium umbellatum* (L.) DC.
common in thickets and
in edge of woods

rhizome scrambling
in shrubs.

tufted, dark green.

culms ascending to erect
shrub

culms solitary or two or three,
ascending.

stiff liana, perianth
bricks red, stamens yellow.
culms ascending.

shrub 2 m. tall;
flowers dull pale pink;
fruit black when ripe.
shrub 3.5 m. tall.

shrub 1 m. tall; flowers
deep rose purple; fruit
black, irregularly circumscissile
when mature.

shrub 3 m. tall; flowers
white

Some areas of fairly good forest on north side, but mostly cleared in interior.

Some white sand showing through scrub along north coast - the beach sand is yellow. Patches of good forest eastward but mostly cultivated. Then coast swings away from course, to south. Visibility becomes poor. End of island at 9:30.

Borneo - Large river with very little swamp. A large sand flat to ~~left~~ left of mouth with uniform scrub vegetation. Country behind this partly wooded but large part cultivated - cleared in strips - system of roads at right angles from road along the large river. Water a peculiar muddy black color. On right bank ~~also~~ also large area cultivated. A meandering tributary has a large patch of forest on its left side.

Pattern of clearing is very odd - long narrow strips at right angles to roads.

Large areas of forest well away from roads, but taking country as a whole the greater part is cleared. Back in country patches become irregular in shape and a typical shifting agriculture pattern appears. But there are larger and larger areas of not much disturbed forest. Clearing along streams.

Then a great area of forest along course that shows little disturbance. Shifting agriculture in the distance. Then close along small river.

Then very large area not at all disturbed, even along small stream. Patches of swamp with bines, more uniform texture. This also along streams in a narrow strip. Much shifting agriculture in distance.

Forest becomes more irregular (heath forest acc. Kosterma). Then a river with sand

along shores. Much shifting agriculture along this river and extending out from it.

Then entirely shifting agriculture and some swamp. Country hilly numerous red gullies or landslides.

Many parallel mountain ridges in distance parallel to course.

Along course nothing but shifting agriculture ~~also~~ on hilly land. Very little forest of any size except on hill-tops.

Spectacular barst with domes and cliffs just back of a small reservoir and some sort of industrial development.

Flying over patches of barst. A paved highway going out into the area where these barst "mogotes".

Many very large barst hills in distance.

Several winding rivers. Paved highway along course. Forest on hills.

Various kinds of agriculture + pasture as we approached airport. Much degraded or secondary forest. Landed at 11 a.m.

Kuching - plants seen

Artocarpus altilis

Pentas coccinea + color forms.

Mussaenda Doria Aurora

Cocos nucifera

Hibiscus tiliaceus

Delonix regia

July 1 - Bukit Timah

in dense rain forest on ^{upper} slopes

43769 (sub.)

common

1 70 Psychotria?

rare

1 71 1 Pentaphragma cf. decurrens Airy Shaw

rare

prostrate; flowers greenish white.

unbranched shrub 1 m.

tall, thyrse white,

~~stems~~ slightly fleshy;

corolla white, tinged

with purple.

flowers white.

July 5 - Trip by launch
Kuching to Bako Nat. Park.

Along Lunai Sarawak
on north bank dwelling
Nipa. Less habitation on
s. bank, no nipa, until
past the factory. Then a
village of long houses.

Around curve, on north
side mangrove swamp, ^{on convex side}
apparently mostly *Avicennia*.
Belukar on the south bank,
on concave side. Ground on
this side perhaps 1 m.
above water (2 ft. m). Tangled,
Pandanus thickets, nipa
locally scattered large ^{common} trees - ~~perhaps~~ *Dios. Heritiera* ^{glabra}.

On next curve, nipa
is on both sides. mangrove
on convex side again.

On concave side slightly
higher ground, with
closed forest. Where
the river is straight
again both sides are at
least 1 m. elev. This is
Prima Donna Beach.

Can see Bukit Sejingat in
distance ahead, high point.

Both banks become lined
with nipa, ^{not high} Part way, on left,
is a high spot, several m.,
partly cut away by river.

Where channel bends slightly
to right, well developed
mangrove swamp, taller
trees *Avicennia*, lower
ones *Rhizophora*.

Out on Turnabout Beach, on
west bank is well developed
mangrove swamp -
Avicennia, some *Rhizophora*
in understory, shrub
layer of ~~*Scaevola*~~ ^{*Brownlowia*} ~~*canis*~~.

Other side is almost
solid nipa, low level
perhaps 0.5 m.

Then this on both sides.
Then on convex left side,
mangrove, mostly *Avicennia*
some nipa. *Scaevola*
~~*ef. extractata*~~ ^{*Brownlowia*}.

On other side around
Biawah (shell tank farm)
extensive nipa, rather
short, extending to Pending Pt.
Probably has been cut.
Mangrove on opposite side,
much nipa in understory.
Avicennia trees rather
widely spaced.

Turned left into Batu
Blat Beach - much wider.
Some settlement in flat
ground 1 m. or so above h.t.
Similar low ground
mostly nipa, on ~~other~~

left bank. Then Nipa on both banks, much Avicennia on left bank. scattered through the Beyond sawmill wide areas of Nipa on both sides. with scattered Avicennia Tanjung Bahru.

Lejingkat ^{Bahr} village on rt. Lejingkat & Bulit Lejingkat on left. Lowlands are vast stretches of Nipa with scattered trees.

Slopes of hill covered by a mixed forest, rather irregular, ~~but~~ perhaps secondary. lowest slopes belukar, regrowth after clearing.

Lejingkat is a sea Dyak village, on piling, on beach. (photos bud, & b.w.)

Beyond this large areas of Nipa swamp on both sides of river. Larger trees well back from river.

Rounding Renard Point large hills come into view ahead, some very high ones in distance.

Low ground with Nipa on both sides. A few large flat topped or umbrella shaped trees some distance from river.

To left some taller palms probably coconut, back of Nipa. Probably plantation on sand ridge in swamp.

Village of Kampong Senari on left. Hill above it covered with apparent second growth.

Across on right - mangrove swamp. A green closed understory (Rhizophora?) and scattered tall Avicennia.

Lungai Baradeh Bera on rt. Nipa on rt. of it, mangrove with dense Rhizophora and sparse taller Avicennia on left.

Scattered small hills with thick woods on left of main river. One in near distance with much of forest leafless (dead?)

Rhizophora on rt. shows a sharp high tide line.

On left, between hills, low stretches of Avicennia swamp, possibly some Sonneratia. Front part low, back of this an abruptly higher closed stand.

On left, ahead, Gunung Ayer - a high forested hill with a village. Kampong Muara Tebas at base.

Some buildings on lower slope of hill.

Opposite point is nipa swamp on river bank, forest of some sort on sea side. This is the mouth of Sungai Kuching.

Clump of Casuarina on outer beach opposite forest back of it.

Tg. Muara Tebar is a headland, grassy on back slope, wooded on sea bluff, rocky shore.

Beyond Tanjung Po sandstone headlands, largely covered with Casuarina cf. sumatrana. Lower wave-cut cliffs are almost completely bare.

Some places broad leaf trees predominate, locally palms (photos bod.) Scaevola just above ^{wave cut} cliffs.

West end of Pulau Laker has only low vegetation (photos & v. bod.)

Along shore of Telok Sebur - Casuarina equisetifolia on shore. Wooded cliffs, then a gently sloping terrace with fine forest, sloping up to a wooded ridge behind.

Across to west are

very high rugged mts. in distance.

Along shore w of Telok Sebur are low wave cut cliffs with or without beach or erosion ramp in front of them. No evidence of habitation.

In some places at the tops of the wave-cut cliffs is a zone of low dwarf scrub or grass. (Interesting on sandstone.)

Beaches at mouths of principal gorges that come down from upper terrace. This upper terrace seems to extend all along coast, locally interrupted by small eminences and gorges. It may be 30-50 m. high.

At Bakro Park Hq. There is a very wide, very gently sloping beach. At high tide mark is a thin sod of Cyperus sp. extending up, with in places an interrupted strip to the edge of the woody vegetation.

Along top of beach are scattered Casuarina trees and between them a thicket or scrub forest of Hibiscus tiliaceus ^(to 9m) and Scaevola taccada (about 4m)

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1963 Borneo - Sarawak

typical to
and
(weeds)July 6 - Bako National Park
Lintang Path, ^{on plateau} back of Telok Assam
~~dissected~~ sandstone,
in thin scrubby forest on43772 (Ochr!) ~~Platanus~~ Euthemia
in undergrowth

73 Litocarpus jahui Hatusima

10 74 Vatica n. sp.
rare1 75 Pteridium aquilinum (L.) Kuhn
occasional in open sandy places.5 75a Garcinia sarawakensis Piron
same - in "padang" a ~~low~~
open scrub area on sandstone1 76 Xyris cf. borneensis Rendle
local2 1 77 Utricularia racemosa? Wall.
rare on wet bank of stream1 78 Drosera spatulata
common on wet bank of stream2 79 Schoenus calostachyus (R.Br.)
common in open places3 80 Isachne confusa Ohwi
common in moist open places2 81 Cladium pennatum or undulatum
abundant in open places4 82 Styphelia malayana (Jack) J.J.Sm.
very common2 82a Cratogeomys glaucum Rath.
common4 84 Lycopodium complanatum L.
abundant

2

82a Dacrydium beccarii var.
undulatum Corner

159

common

Shrub 3 m tall

75-100m

min. Jack. shrub 1-2 m. tall

small tree, about 8 m. tall,
wings of fruit reddish

flowers yellow

plant red, leaves appressed
to ground, flowers pink.Poin. caespitose, culms
ascending to erect.

caespitose.

Trichostularia undulata (Thunb.) Kern
caespitose.

shrub 2 m. tall, flowers

white, fruit red, fleshy.

shrub, sap orange,

flowers maroon.

rhizome creeping, somewhat
buried, stems erect,branching somewhat distinctive
in sterile shoots.

July 1 - Balro Park
 then scrubby forest
 on dissected sandstone
 at top of cliffs.
Eugenia

"Padang" on top of sandstone
 plateau is an open scrub
 of irregular height,
 1-4 m. occ. slender taller
 trees, with a generally
 a thick herb layer of
Lycopodium complanatum,
Gleichenia linearis,
Cladium & many other
 herbs. (photos)
 Also ant rubiaceae (photos)

When a rock ridge
 borders the Padang there
 is dense forest of mostly
 small trees, max. 3 dm. dbh.
 very closely spaced, with
 much *Eugenia* with
 terrible flat reflexed spines
 on petioles. Also a curious
 acanthescent palm with
 undivided plicate leaves.
 oblanceolate. photo (herb)

A layer of tough great
 cover the ground
 filled with roots. 'Rattan'.
Dacrydium & *Casuarina* common.

In some open areas
Dacrydium beccarii is
 a shrub 2 m. tall and
 forms an open scrub.

Oct. from 1911, 59

- 43785 *Burmannia coelestis* Don
occasional in moist open places.
- 3 86 *Hydnophytum coriaceum* Becc.
very common, epiphytic
- 1 87 *Rhynchospora rubra* (Lour.) Makino
rare, in trail
- 1 88 *Ploiarium alternifolium* (Vahl) Melch.
common
- 4 89 *Cinnamomum Kibria coriacea* Cogn.
common
- 2 90 *Gleichenia linearis* (Lam.) f.
abundant
- 4 91 *Lindsaea (Lindsaea) ensifolia* Sw.
abundant along trails and
in open spots on fine white sand
- 4 92 *Glochidion brunnescens* Hook. f.
rare
- 2 93 *Baeckia frutescens* L.
locally abundant
- same - "beath forest" on
sandstone ridges
- 3 94 *Psychotria*
- 3 95 ~~*Psychotria*~~ *galetnera vaginans* (DC.) Val.
- 2 96 *Mapania cuspidata* var. *petiolata*
very local

flowers purple, tips pale
green, turning dark purple.
tubercle 1 dm. diam, filled
with galleries, ant
very numerous. flowers
white.

culms spreading.

shrub 2 m. tall.

shrub 3 m. tall,
ripe fruit black.
forming low tangles.

rhizome buried; prostrate
strictly erect.

small tree, 4 m. tall, fls. pale
green, fruit almost white.
leaves white beneath with
reddish midrib

shrub 1 m. tall; leaves
aromatic when crushed;
flowers white, tiny.

100 yd

vine, climbing to
shrubs; flowers greenish white.
~~small~~ shrub, 2 m. tall.

Val.

same - mixed Dipterocarp forest
on steep slopes

43797 *sub. Lasianthus*
rare

2 98 *Artocarpus anisophyllus* Miq.

~~large~~
Babo National Park, Telok Assam
~~same~~ - ^{on} wet rocks
at base of cliffs

99 *arac.*

very common

~~43799~~

same - on sand flat at
mouth of estuary

43800 *Sonneratia ^{avata J. Sm.} ~~casuarina~~*

forming open forest on sand
inundated daily

same - along beach

2 01 *Ischaemum muticum* L.
abundant in edge of scrub
at top of beach

2 02 *Hibiscus tiliaceus* L.
common in scrub

3 03 *Vitex pubescens* Vahl

one tree in open grassy place back of

6 04 *Scaevola taccada* (Gaertn.) Roxb.
common in scrub

2 05 *Wedelia biflora* (L.) DC.

very local in openings

3 06 *Cyperus stoloniferus* Retz.

forming thin sod at and below high tide

shrub 2 m. tall.

leaves on ground under
very large tree.

4 m

0 m

tree 10 m. tall

1 m

prostrate, forming mat,
tips of culms ascending.

tree 6 m. tall (others taller),
flowers yellow, nodding,
not fully opening
even in afternoon.

1 m.

small tree 5 m. tall;

beach - flowers purplish; fruit immature,
1 m. much branched shrub
4 m tall; flower pale purple;
fruit white.

1 m.

spreading herb; rays
yellow.

0 m

rhizomes and ~~tubers~~ tubers deeply
buried, wetter exposed, culm ascending.

July 7 - Lang Tabong - a rugged sandstone mountain on a peninsula.

Lower slopes secondary. Flats at bottom are in coconut plantation.

Also on flat ground an open scrub of *Rhodomyrtus tomentosa*.

Across a small stream is a steep cliff along one side of the stream ravine. Above this

on the more or less gentle slope is a rubber plantation, very run down and neglected, but with a good fern flora. A few native trees mixed with the *Hevea*.

Polypodium aff. *spectans* but with short erect rhizome is locally common.

Along a stream ravine in sandstone rock ferns are abundant.

This ravine contains native thickets, incl. a pink-flowered *Lamprolaima*. On this a very fast moving pseudoscorpion.

Several ferns have some anthocyanins, red

Lang
Tabong
River.

a *Lygodium*, a *Dipteris*, and a *Polypodium*?

The flat with the *Rhodomyrtus* also has *Melastoma* and areas of *Pteridium*. Very hot.

Trip in small boat back to Kuching - a channel east from Lang Tabong is between mangrove swamps. Mainly an ^{almost} closed canopy, at least close to river, of *Avicennia*, with a thicker understory of green, not clear what. *Sonneratia caseolaris* fringe. Erect part rather gray-green, but just above high tide horizontal branches with greener leaves. This on convex side of large bend. On opposite side, *Nipa* with various trees. (acc. *Kostermans* this on natural levees.)

The river straightens ~~the~~ *Rhizophora* assumes dominance on both sides with some *Nipa* and some other things. This swamp is of low stature 4-5 m ± few emergents, mostly *Avicennia*.

Santubong
July 7 - [Lang To Bong]
about 16 mi. north of Kuching

- 43807 2 *Hedyotis* cf. *perfoliata* Wall.
common along trail in hot
sand flat in open scrub
of *Rhodomyrtus*.
same - in undergrowth in
neglected rubber plantation
on sloping sandy and rocky ground.
- 3 08 *Lygodium digitatum* (Burm. f.) Sw.
occasional
- 1 09 *Schizaea dichotoma* (L.) Sm.
rare
- 2 10 *Lygodium* cf. *longifolium* (Willd.) Sm.
occasional
- 1 11 ~~(fern)~~ *Taenitis blechnoides* (Willd.) Sw.
very common
- 4 12 ~~*Polypodium*~~ *Tectaria plataniifolia* (Metz.) Copel.
common
- 2 13 *Lasiacanthus chrysus* Ridl.
rare
- 3 14 (aroid) *Homalomena angustifolia* (Jack) Hook. f.
common on rocks in small stream
same - in deep moist ravine
in sandstone
- 7 15 *Saurauia*
rare
- 6 16 *Trichomanes javanicum* Bl.
common on wet sandstone walls
- 5 17 ~~*Polypodium*~~ *Cyclopetis presliana* (J. Sm.) Presl.
common on sandstone wall (p. 172)

2 m. flowers white.

100 m.

Twiner, climbing on small
trees, young growth green.

Twiner climbing on small
saplings, sterile; young
growth purplish.
rhizome short, erect.

rhizome short, erect or
nearly so, fronds crowded.
slender shrub 1.5 m. tall,
fruits bright blue, fleshy.
spathe white.

slender shrub 3 m. tall,
branches drooping; inflo-
rescence pink, tending to be erect, fl. pink.

fronds persistent

As river bends to left
Avicennia becomes dominant
 on left bank. *Nipa* and
Rhizophora on right.

Then an area of possibly *Ceriops*
~~*Bougainvillea*~~ sp. Then in
 straight river mixture
 of *Nipa* and *Rhizophora*,
 some *Avicennia*, *Ceriops*

Upstream, still straight,
Nipa more abundant along
 river bank, but trees abundant
 back a few yards, said to
 be growing on mud, but
 very slightly higher than
 the *Nipa*.

Then on left some heavy
 silt soil about 1.5 m above
 h.t. This has houses.

On up the river there are areas
 where at high tide level is a
 dense stand about 1 m. or more tall
 of *Brownlowia teresa* (photo box)

Two species of *Avicennia*
 Water very salty.

Junction with Sarawak
 River.

(*Brownlowia teresa* flowers -
 calyx somewhat ~~re~~ reflexed,
 old - rose color. Stamens well-
 exerted, bright yellow.)

(from p. 169)

same - in neglected rubber plantation

43819

Dipteris

common on ground

1 19

Polypodium?

rare, on ground

July 7 - Sangto Bong River
between Sangto Bong and
Sarawak River.
in edge of mangrove
swamp.

6 20

Avicennia officinalis L.
occasional

12 21

Broussonetia *tensa* (L.) Kost.
abundant, forming a
solid layer at high tide
level in certain areas

Semengoh

July 10 - Arboretum, Semengoh
Forest Reserve

in mixed Dipterocarp forest.

11 22

~~*Aspidosiphon*~~ *axinanthra*

rare

Axinandra coriacea Baill.

1 23

~~*Galearia*~~ *galearia* *gremmii* v. *gremmii* ^{tenerum Mg.}

rare

2 24

~~*Fagraea*~~ *Ternstroemia magnifica* Stapf
climber

1 25

Aglaia chassiana *unifoliolata* Ridl.

10 26

Myristica ~~*cinamomum*~~ ^{invers Bl.}
(to 178)

young fronds purplish.

young fronds purplish.

0 m.

tree 10 m. tall; buds
blackish.

shrub, emerged part
at high tide 1.5 m. high,
leaves bronze beneath;
flowers with calyx lobes
somewhat reflexed, old-rose
in color, stamens erect,
bright yellow (material
mostly only in bud).

60-90 m.

tree about 25 m. tall, 2 dm dbh,
base trunk.

shrub 1 m. tall

vine, 20 m. long, flowers
cream, turning yellowish.small tree, fruit fleshy,
subglobose, orange red.tree about 30 m. tall,
fissured blackish bark.

July 10 - Trip Kuching to Semenggoh Forest Res.

Leaving Kuching - various stages of second growth.

Then cleared peat swamp with rubber plantation above Dyera etc. emergent left. *Melaleuca* introduced and spreading.

Mostly higher ground and various stages of second growth. Patches of *Imperata*.

A few low hills of deeply weathered intrusive rocks. Mostly rolling land of Biau formation.

Arboretum: around h.g. some *Gmelina arborea*, planted to shade young dipterocarp.

High mixed dipterocarp forest on slope. Trees of all diameters and heights, to 100 ft + 40 m. tall. The canopy is very irregular, no one layer nearly complete, but in toto complete emergent trees very common (photos - br w + bud. from 30, 50 + 80' + bud. from 20')

Epiphytes (vascular) general but few at all levels. Crustose lichens abundant.

moss scarce. General xerophytic aspect in topmost trees. Lvs. small but not microphyllous. Black ants running up and down topmost branches.

(photos br w + bud. from 100')

Coll. from tree 2298. *Asimanthus*

The shrub layer 1-4 m. moderately dense, no obstruction to walking except where are rattans and other spiny palms.

Herb layer very sparse except in low bottomland areas, where there are a good number of many sorts of herbs.

Occasional large aculeate epiphytic *Pandanus*. Similar one seen on ground.

July 10 - trip Semengoh to Ban
Secondary thickets
and pepper plantations,
giving way to rubber
plantations and thickets.
Crossed Farauak River
at Batu Kitang. This
village was completely
submerged by flood
in Dec. to March 1962-3.

After this much rubber
with some small thicket
and patches of secondary
growth.

On hills torn up
by gold mining solid
secondary growth - Imperata
mosaic

Ban limestone hill -
Cochit type of karst,
with very sharp pinnacles
erosion. Gentler parts
covered by tall forest, except
flat bottoms which have
been cleared.

Steeper slopes covered by
a scrub of shrubs of various
sorts covered with lianas.
Some small pandanus.
Cliffs with gesneriads,
etc. Some of these have
been burned over.

A few trees in scrub on
steep slopes.

~~July 10~~ ctd. from p. 173

- 43827 *Trichomanes cf. cupressoides* Desv.
rare on forest floor
1 28 *Ischizaea dichotoma* (L.) Sm.
rare on forest floor
4 29 *Harquana malayana* (Jack) Merr.
rare on forest floor (near tower)

July 10 Bau Hills, south of Kudat
on vertically eroded limestone

- 1 30 *Grammitis*
rare on rock
4 31 (~~Geac.~~) *Bowie?* *Parabola clarkii* B.L. Burtt
common on cliffs
1 32 ~~Pterisanthes~~ *Pterisanthes*
rare
1 33 *Podocarpus neriifolius* Don
rare
2 34 *Stereulia rubiginosa* Vent
rare
6 35 *Cyrtandra* ~~oblongifolia~~ *oblongifolia* (Bl.) C.B. Cl.
common
5 36 (~~Vit.~~) *Tetrastigma*
rare
10 37 *Antidesma rostrata* M.-A.
4 38 *Begonia holtumii* Irmisch. vel aff.
occasional
6 39 *Pinorea glandulosa* (Ebm.) Merr.
rare
1 40 *Grammitis*
occasional, epiphytic on shrub
3 41 (~~fern~~) *Pyrosia nummularifolia* (Sw.) Ching
very common climbing on rocks and tree trunks

dark green.

large rosette, inflorescence
lying on ground,
fruits vermilion.

flowers white.

vine, fruits immature.

(brought by boy) sterile.

inflorescences and buds red.

vine; fruit fleshy,
scarlet when ripe.

small tree; fruit immature.

stems and main leaf vein
red-brown, flowers bright pink.
slender shrub, 2 m. tall,
fruit immature.

Trunks
closely appressed to substrate.

July 11 - flight Kuching - Brunei
Follier Friendship at side.

Left Kuching 12:15

Largely rubber with
swamp forest and nipa
along tidal rivers. Patches
of pepper garden close to
Kuching.

Nipa swamp is very
extensive, not merely
a fringe along river. Some
trees scattered in it.

Away from rivers are
patches of forest, and
some shifting agriculture
and second-growth where
there is slightly higher
ground.

Great pattern of meandering
rivers like a salt marsh
on a gigantic scale.

Sadong R. - Coconut planta-
tion on ~~the~~ flat ground,
formerly peat swamp.

Sea off shore very muddy.

Coast lined with mangrove
to some width. Back of this
a ~~strip~~ strip of forest, ^{about as wide}
Mangroves are here dominated
by *Avicennia alba*.

Back of forest strip land
largely cultivated.

12:30 left coast. Sea is muddy.

12:41 passed north of Batang Lupar

Visibility very poor.

12:25-30 - winding estuaries
to be seen in distance.

Saribas River.

Rivers tend to have
tributaries that meander
with general direction
parallel to coast, not far
back of coast.

12:31 Approaching coast again.
near Pg. Jerijeh.

Some cultivation just
back of coastal swamps,
but very local.

12:37 Two large rivers with
a very extensive tidal pattern.
Mangroves ~~along~~ along
channels, peat swamp
away from them.

12:35-40 A tremendous network
of tidal channels enclosing
blocks of peat swamps and locally
some herbaceous vegetation -
perhaps old cultivation on
slightly higher ground
where the peat was very shallow.
These form concentric rings
around swamps areas and
inside mangrove belts.

Peat swamp is brownish
and fine textured, where
there has been disturbance
texture is coarser - *Shorea albidula*
crowns. 12:40 no more visibility.

1:02 Glimpse of coastline - absolutely straight - forest not clearly seen but said to be solid Casuarina equisetifolia all along beach, peat swamp behind it.

1:12 Coastline in distance, mostly with sand beaches, some small bluff-like points.

1:20 Tanjung Similajau

Long sandy beach (with ^{single} rounded cusp to s.e.) Backed by great expanse of peat swamp. Very shallow water close to shore. Only a few very small rivers here. Mouths seem to swing to & fro along coast, separated by narrow or wide spits. Some clearing well back, extends to a little to the beach locally (1:26). A low wave-cut cliff for some distance. Low hills, well wooded and with abundant erosion scars, extending back from it.

12:28 Road along coast, turning inland, old timber road.

12:32 Miri rather diffuse town. New road being built to Kuching - awful gash.

12:34 Blackest river I have seen, small, meandering

through enormous area of peat swamp - mostly dominated by a grayish tree, prob. Shorea albida. Some parts evidently a pure stand.

1:35 Baram River - brown. Variation from area of solid Shorea albida, thinning out to very mixed forest with little or no Shorea albida.

1:38 Balait R.

1:39 railroad ~~is~~ through very even forest, but with a large patch with no trees - killed by caterpillars? (to be visited tomorrow)

1:42 Andulan F.R. with vast area of mixed Dipterocarp forest. Some trees (will visit this) flowering.

Becomes rather hilly with more and more shifting agriculture (old). Lake Marimbam in distance. (natural shallow lake)

1:44 Tutong River. Much clearing along it.

Then forested hills - mixed Dipterocarp with some patches of secondary growth. Somewhat hilly.

1:46 patches of pasture
with cattle trail (water buffalo
much cultivation along road.
long straight ridges with
mixed dipterocarp forest.
Limbang R. beyond them.
These ridges parallel to
road and course.

Large clear area, partly
in wet rice, along road and
course.

Then a hilly area with
mostly patches of secondary
forest & cultivation.

1:10 Brunei to right.

Mosaic of secondary
growth on small hills.

Scattered houses on road
out of Brunei, beyond airport.
scraps of good forest here
and there on hills. Mostly
secondary. Some rubber
plantation.

1:54 am. Brunei airport.

Brunei - ferries by bus.

magnificent mosque and town
on piling.
Rubber!

Small swamp of Pandanus
& ~~Rhizophora~~, mangroves.

Just out of Brunei.

Old fruit plantation
with enormous mangifera, etc.
Thick undergrowth, mainly
seedlings & small shrubs.

Kalanas - photos of Mangifera
sp. & Durio sp. (b+w)
Mussaenda in secondary
thickets.

Photos of Kedayan rice store
houses (b+w)

Road cuts ~~thru~~ three tilted
beds of shales and sandstones
of different colors & hardness.

Tutag River - photos (b+w. & Kodak)
of *Heisteria globosa*.

Then a swamp of *Combretum* -
cayenne scattered over a
continuous shrub layer
of *Ploraria*
(b+w. 2 photos.)

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bet Telisai & Lungai Liang
b.t.w. photos of raised
sand road out

187

- 43842 July 11 - just outside Brunei
Schizaea dichotoma (L.) Sw.
 4 common in dense ^{old} plantation
 of large fruit trees
- 2 42a *Ophiorhiza*
 same
 July 11 - Kalanas

- 4 43 *Mussaenda cocinea* Stapf
 in secondary thickets and
 hedgerows

July 11

- 1 44 *Clab.*
 half buried in sand
- 1 45 *Hippodamia* Hedysotis cf. *pinifolia* Wall.
 common on bare sand
- 2 46 *Calophyllum obliquinervium* Hend. & W.-S.
 common
- 1 47 *Timonius flavescens* (Jack) Baker
 rare
- 2 48 *Ormosia banksiana* (Miq.) Prain
 occasional
- 4 49 *Glochidion celastroides* (M.-A.) Pax
 common
- 2 50 *Eugenia ampullaria* Stapf
 occasional
- 2 51 *Tristania obovata* R. Br.
 common
- 3 52 *Canthium didymum* Gaertn. f.
 rare

woody climber, flower
 orange-yellow, calyx lobes white.

flower purple.

flower white

shrub 4 m. tall,
 flower white.

shrub; fruit immature

small tree 5 m. tall;
 seeds scarlet.

shrub; leaves almost
 white beneath, flowers
 greenish white, fragrant.
 small tree; flowers white.

shrub 1-1.5 m. tall,
 flowers yellowish.
 small tree, leaves
 apparently distichous.

43853 *Psychotria obovata* Wall.

occasional

1 54 *Isora amplipecta* Brem.

rare

3 55 *Styphelia malayana* (Jack) J.J.Sm.

common

July 11 - bet. Telisai and
Lungai Liang1 56 *Fimbristylis schoenoides*
rare in wet grass along road
in white sandJuly 12 - ~~peat~~ just south
of Seriain peat swamp dominated
by *Shorea albida*1 57 (rub) *Lecananthus eubescens* Jack.

rare on floor of forest

1 58 *Ficus deltoidea* var. *molle* (Rig.) Corner

rare on floor of forest

3 59 *Poikilospermum*
rare in secondary thicket

at edge of primary forest

3 60 *Nepenthes bicalcarata* Hook. f.
at edge of grassy thicket
~~near~~ in railroad clearing

in primary forest

1 61 *Shorea albida* Lym.

dominant in forest

4 62 *Asplenium longissimum* Bl.

common on forest floor

3 63 ~~Quercus~~ *Lithocarpus gundacius* (Bl.) Rehd.
in secondary thicket in edge of clearing

climber, fruit white, fleshy.

shrub; flowers vermilion

shrub to 1 m. tall, flowers
white, fruit orange-red.

semi-prostrate shrub

erect shrub 1 m. tall.

depressed shrub.

spherical heads bright
purple.sprawling climber 2 m. ^{long}~~seeds~~ on supported
by grass, flowers
green, turning red. Peristome
striate.

leaves, fruits and

seedlings on floor of forest.

fronds rarely rooting
at tips.

Trees 5 m. tall.

- July 12 - in middle of
Badas Swamp, s. of Seria
in peat swamp forest
on deep lens-shaped
peat body
- 43864 (sub.) *Lecananthus erubescens* Jack
on fallen logs and peat
- 65 *Ficus deltoidea* var. *motleyana* (Miq.) Corner
in edge of small opening
(perhaps opened by lightning)
- 66 *Taranna ~~fragrans~~* (Bl.) Kunt. & Val.
rare in shrub layer
- 67 *Psychotria*
rare in shrub layer
- 68 *Clerodendrum fistulosum* Becc.
rare in shrub layer
- 69 *Melastoma malabathricum* L.
common in railroad clearing
- 70 *Timonius ~~pedunculatus~~* (Walt.) Ridd.
salicifolius Val.
common in secondary
thickets at edges of railroad
clearing
- 71 *Timonius ~~pedunculatus~~* (Walt.) Ridd.
flavescens (Jack) Baker
common in secondary
thickets at edges of
railroad clearing

- subprostrate shrub,
flowers white.
erect shrub 1 m. tall,
fruit immature.
- shrub 1.5 m. tall; fruit
immature.
- shrub 1 m. tall.
- stems with swollen
internodes, in which
ants live; calyces magenta.
shrub 1 m. tall,
flowers deep rose pink.
- shrub 2 m. tall,
flowers whitish, staminate
- shrub 2 m. tall, fruit immature.

July 12 - Badar

on sandy soil at edge of
peat swamp43872 *Pithecellobium angulatum* Bth.

3

common in ~~the~~ thickets

at edges of railroad clearing

21 73 *Hedyotis corymbosa* (L.) Lam.
occasional on open sand
around buildings~~74 moss.~~same - on ~~slope~~ in *Agathis*
forest on white sand ridge

2 74 (moss)

on ground

2 75 (moss)

on ground

1 76 ~~Urophyllum~~ *Gaetneria vaginans* (DC.) Merr.
in undergrowth2 77 *Lurunga* *carriifolia* Tanaka
in undergrowth2 78 *ixora* ~~salicifolia~~ *pypantha* Brem.
occasional in undergrowth

2 79 (myrs?)

occasional in undergrowth

1 80 *Psychotria*
rare in undergrowth

1 81 (Lap.)

rare in undergrowth

3 82 (Annon.) *Dicarpalum anomalum* Hook. f.
rare in undergrowthmuch branched tree
about 5 m. tall; pods
bright orange, seeds black.
flowers white.

shrub

large shrub,
fruit turning yellowish,
aromatic.slender shrub, sparsely
branched; flowers orange red.

slender shrub,

fruit pale green.

slender shrub 2 m. tall;
inflorescence very fleshy,
pink, fruit black, soft.slender erect unbranched
shrub, racemes cauliflorous,
flowers dark red.small tree; calyx purple,
stipes turning reddish.

~~43883~~ *Decasium baccii* var. *reticulatum* (Carr.)
common

43883 (Myrs.) *Ardisia crassa* Cladse
rare in undergrowth.

1 84 *Polygala*
rare in undergrowth

1 85 *Erythroxylum cuneatum* (Miq.) Kurz
rare in undergrowth

2 86 (Euph.) *Agrostistachys leptostachya* Pax & Hoffm.
rare in undergrowth

same - on sand ~~along~~
railroad

1 87 *Spermarone supputicosa* R.Br. ex Benth.
common

same - in open shrubby
swamp along Belait River

3 88 ~~Hosea~~ *lobbia* (Ridl.) Merr.
(Clairse) Ridl.
common climbing
shrubs and small trees

3 89 *Scleria*
common in slightly
raised places in mud.

July 12 - *Scleria*, in
grassy edge of peat
swamp.

7 90 *Cordia cylindrostachya* Roem. & Schult.
common (said to have
been introduced recently)

shrub 3 m. tall

flowers pinkish white.

flowers with wings
purplish, keel white with
bright orange distal portion.
fruit scarlet, fleshy.
fruit immature.

flowers pinkish white.

inundated at high water

liang; bracts and
corollas a striking
orange, stamens ~~and~~ fruit
maroon.

culms erect or ascending,
2 m. tall.

shrub 1.5 m. tall,
spikes tending to droop;
flowers white, fruit red.

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